AIR CONDITIONING HEATING AND VENTILATING

APRIL, 1957—54th Year

Air Conditioning Facilitates Surgery in Operating Room. See page 73

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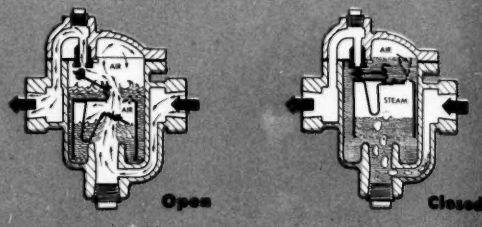
NO OTHER STEAM TRAP

gives you all these features for Low Pressure Heating Service!

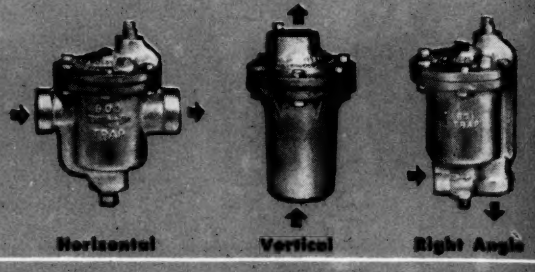
1. QUICK HEATING

Use of a "blast" bucket with auxiliary thermic vent gives maximum air-handling capacity. Air and water blow straight through until steam closes vent.



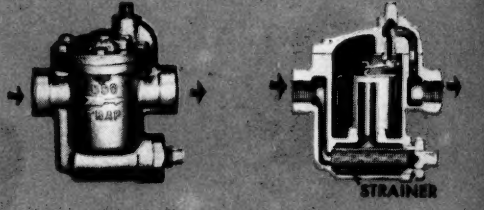
2. EASY INSTALLATION

Any pipe connection—horizontal, vertical or angle—available for the majority of installations to save time, labor and fittings.



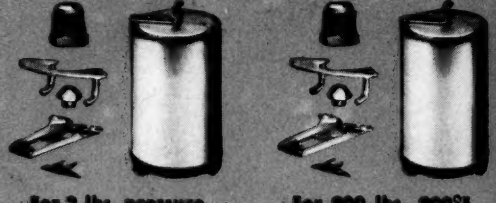
3. INTEGRAL STRAINER

The four most commonly used trap sizes are available with strainers built-in to the body to save time, labor and money through faster installation with fewer fittings.



4. STAINLESS MECHANISM

Valve and seat of hardened chrome steel, all other parts 18-8 stainless—*identical* to materials and workmanship used in traps for 900 lbs., 900°F.



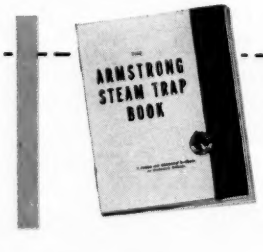
Dependable... Guaranteed Performance...

Self-scrubbing... Non Air Binding... Immune to Corrosion.

Traps and Parts in Stock in Over 100 Cities. Call your nearby Armstrong Representative or Jobber Today.

ARMSTRONG MACHINE WORKS

8463 Maple Street, Three Rivers, Michigan



Send for Catalog

—the Armstrong Steam Trap Book gives complete data and prices, tells what size trap to use.

ARMSTRONG STEAM TRAPS

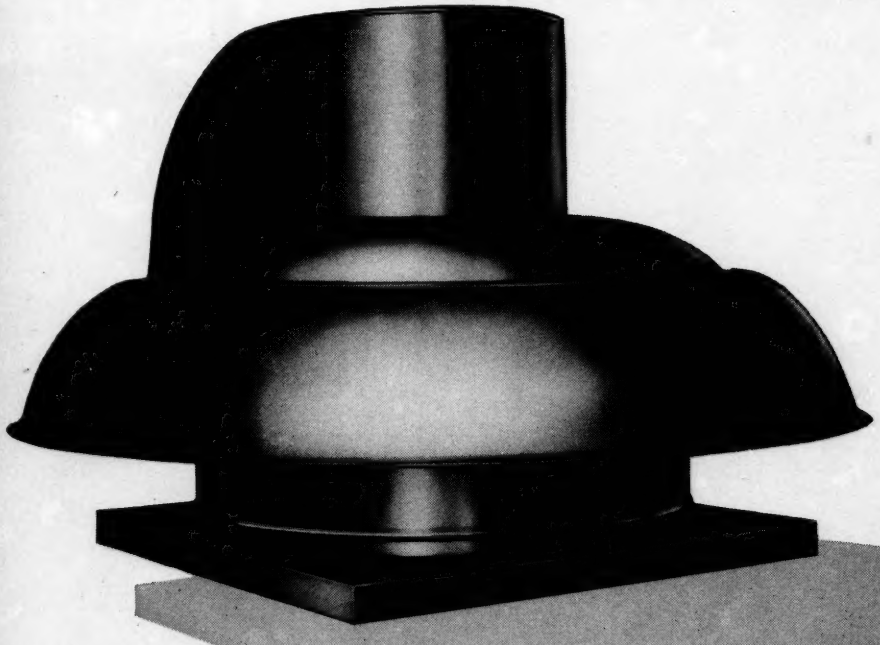
the whisper-quiet roof ventilator with the

LOW

LOW

LOW

SILHOUETTE



So low . . . so distinctively profiled, this centrifugal roof ventilator blends well with modern architecture. It's ideal for schools, hospitals . . . wherever appearance and whisper-quiet operation are musts. Runs at low speeds, moves large volumes of air efficiently against static pressure. Send for catalog.

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American Machine and Metals, Inc.

EAST MOLINE, ILLINOIS

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Division of American Machine and Metals, Inc.
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Please send 16-page Centrifugal Roof Ventilator catalog containing section, "How to select a roof ventilator."

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Behind the handsome exterior of the Webster Newport is personal comfort, for gentle warmth in winter, cool air in summer. Self-contained, hermetically sealed refrigeration cycle . . . needs no ductwork, no water, no cooling towers. Through-the-wall, room-by-room installation means economies in new construction and no loss of revenue during change-over in existing buildings. For steam or hot water heating systems.

With the Webster Newport, you get the service of Webster's Finest Product — the Warren Webster Man. Talk to him today . . . or ask for Bulletin B-2020. Warren Webster & Company, Camden 5, New Jersey. Since 1888. Offices in 66 Principal U.S. Cities and Canada.

Webster's Finest Product . . . the Warren Webster Man

WARREN WEBSTER

HEATING . . . COOLING

AIR CONDITIONING HEATING AND VENTILATING

APRIL, 1957

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The Cover: Performing an operation in a Perth Amboy, N. J., hospital. Center light also serves as a protection against infection.

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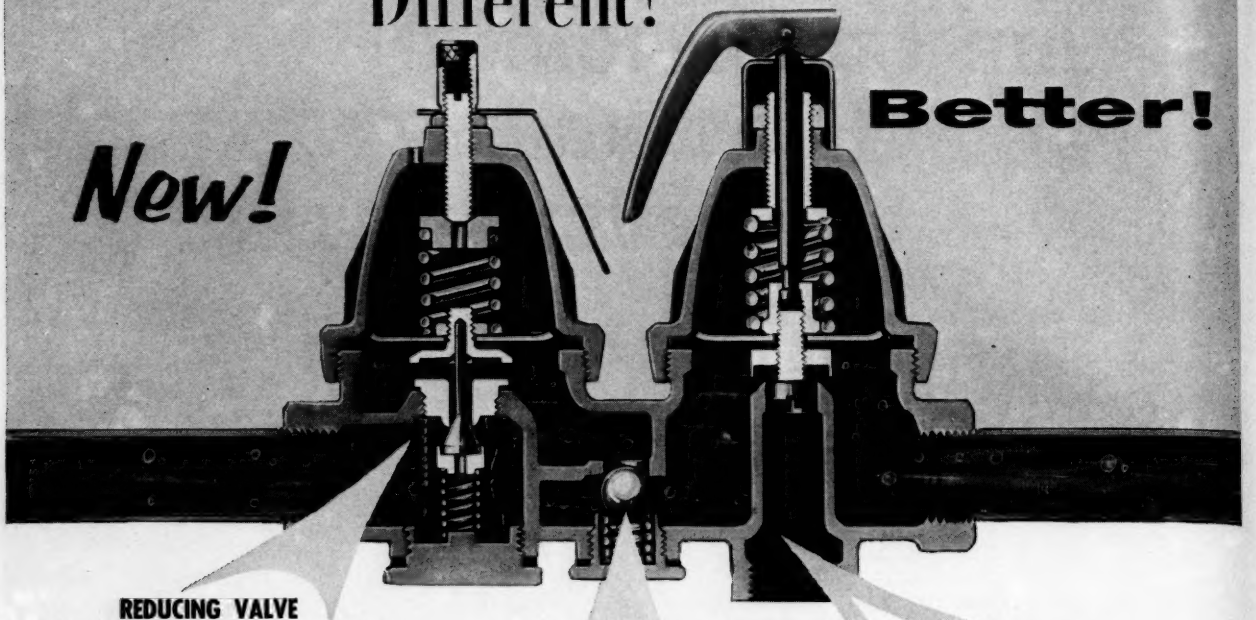
New!

Better!



REDUCING VALVE
Guideless, Stickage-free Design

Greatest advancement in Dual Control Maintenance — reducing valve can be serviced right in the line by merely shutting off the incoming water supply — no need to pull a vacuum or drain the heating system.

CHECK VALVE
Built-in, Ball Type

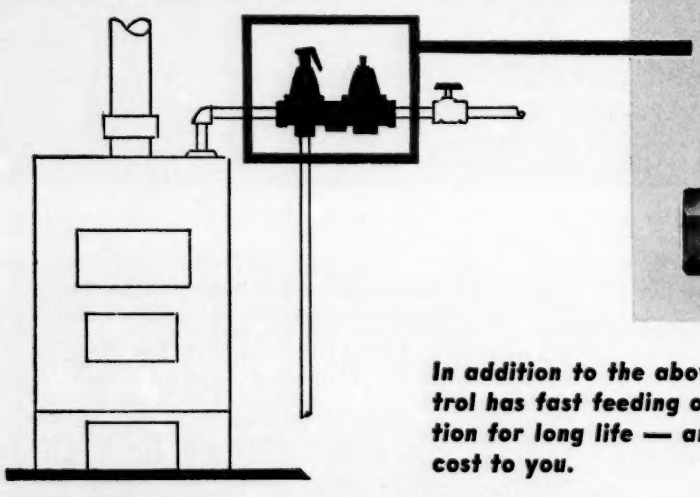
High flow rate, noise-free operation. Reducing valve isolated from deteriorating influences of boiler pressure fluctuation for extra life. Diaphragm of regulator never subject to more than reduced pressure setting of 12-15 lbs.

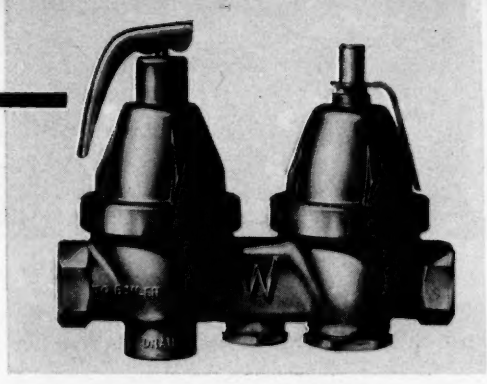
RELIEF VALVE
Bottom Drain

The relief valve of the New Watts Dual Control No. 450 has been designed so that the drain connection is on the bottom of the dual control. This affords the most economical drain pipe hookup.

Watts No. 450 new Dual Control

Designed for the Heating Contractor





In addition to the above big new features, this dual control has fast feeding operation — bronze body construction for long life — and built-in check valve at no extra cost to you.

WATTS REGULATOR COMPANY

LAWRENCE, MASSACHUSETTS

A Great Line of Plumbing and Heating Safety Valves and Controls

HIGH SPOTS

• Manufacturers' shipments of compressor bodies of the type used in **automotive air conditioning** were 255,348 out of a total of 4,477,457 bodies used in air conditioning and refrigeration units during the first 11 months of 1956, a 5.7% slice of an industry that was 37% ahead of the previous year, ARI reports.

• Great Britain has decided to build **16 more nuclear power stations** which will, by 1965, bring the total to 19 stations in operation. Engineers calculated the plants will save 18 million tons of coal a year, and relieve for Britain the heavy financial burden of buying foreign fuel, chiefly oil.

• **Research for Profit** will be the theme of the **National Industrial Research Conference** in Chicago on April 24 and 25, 1957. Sponsored by Armour Research Foundation of Illinois Institute of Technology, the conference will be the focal point of National Industrial Research Week, April 21-27.

• New developments in automatic anthracite heating equipment for more economical space heating in large and small buildings and the fundamentals of air pollution control by municipalities will be discussed at the first **Tri-State Anthracite Conference** at Elmira, N. Y., April 22 and 23, 1957. A representative group of prominent architects, heating engineers, federal and state officials will take part in the conference, which will include field inspection trips to typical new anthracite heating installations in schools, manufacturing plants, and public buildings in the Elmira area.

• The **Semi-Annual Meeting of ASHAE** will be held June 24-26, 1957, at Murray Bay, Quebec, Canada. One of the two planned symposiums is on Air Conditioning Instrumentation and will be moderated by Prof. C. H. Pesterfield, East Lansing, Mich. The other, on Sound and Vibration, will be moderated by J. B. Graham, Buffalo, N. Y. Approximately 14 papers will be included in the program.

• The National Committee on Radiation Protection has **cut by one-third the maximum permissible dose of radiation** to which individuals should be exposed, it was disclosed by Dr. Lauriston S. Taylor of the National Bureau of Standards. At the same time, Dr. James F. Crow, Professor of Genetics at University of Wisconsin, stated that there is no "safe" dose of radiation; each dose, however small, causes a risk of genetic harm proportional to the dose.

• The **doubling of the nation's fuel demands** was forecast before the ASME 1957 annual convention, the Bituminous Coal Institute reports. Research experts saw coal taking on new competitive ability to share the gains. Both Dr. Clyde Williams, President of Battelle Memorial Institute, and Perry D. Teitelbaum, economist for the National Planning Association of Washington, predicted coal gaining by technological advances as well as new export demand.

• The Commercial and Industrial Sections of **Oil Heat Institute of America, Inc.,** has indefinitely postponed the 3rd Annual Oil Burning and Equipment Conference scheduled for April 15-17, 1957.

WASHINGTON OVERTONES

by LORING OVERMAN

● Approach of the April 15 tax deadline sounded one of the clearest overtones heard in the Nation's Capital for many a year—a rising crescendo of **protest against high taxes** and the proposed $71.8 billion budget for 1958.

● Echoing grassroots concern, Congressional delegations asked the Administration to indicate areas in which the record peacetime budget might be pruned.

● Administration spokesmen countered by suggesting that Congress ask constituents to stop pressing for government financial aid on pet projects.

● Chamber of Commerce of the United States held a special briefing session March 14-15 to **outline possible economies;** to instruct conferees how to tell the economy story to members of Congress, and how to stir up further support "back home."

● Viewpoint of Chamber is that **five billion dollars could be lopped off** the budget without curtailing essential Government functions, including defense.

● Members of Congress concede that pressures for economy are greatest ever. Ruefully, however, they report that equal pressures for continued federal expenditures come from those who would be affected by the economy axe.

● Congressional dilemma was expressed by Speaker Sam Rayburn. Said he: "You can talk all you want about cutting the budget, but that just isn't going to be done. Taxes are high and are going to stay high. Government is big and is going to stay big. Whether expenses can ever be cut is a matter I wouldn't want to pass on."

● Less certain is Chairman Clarence Cannon (D-Mo.), House Appropriations Committee. He believes **Congress can and will cut more than $4 billion** from the '58 budget. Military is being asked to show how it could absorb cuts of $1 billion each for Army and Navy and $1½ billions for Air Force. Another $517 millions, slashed by the House from proposed budgets of 18 independent government agencies, is expected to be agreed to by the Senate.

● Unfortunate overtone of any proposed tax cut is the necessity to reduce expenditures. This, in turn, hits the pocketbooks of a few; a few hundred, or a few thousand. Result, usually, is a loud protest drowning out the original petition for tax relief.

● Example: Several current **proposals for budget-trimming involve construction.** In turn, these implicate members of the air-conditioning, heating, and ventilating industries.

● First of the Government agencies to concede possibility of budget cut was Housing and Home Finance Agency. Administrator Cole said that, in deference to economy move, his budget requests could be trimmed by $200 million without adverse affect on housing activity. He suggested:

● $100 million cut in fund requested to encouraging low-cost private housing; new housing in cleared slum areas, and for rehabilitation of homes in such areas.

● $75 million cut in funds to encourage communities to launch urban renewal projects.

● $25 million less for college housing.

● Some Washington observers regard the suggesting $200 million "savings" as mere bookkeeping transactions.

● Viewpoints concerning effects of curtailed spending and tightened credit on the construction industries et al are bitterly varied.

● William McChesney Martin, Chairman, Federal Reserve Board, told Washington's National Press Club he could see **no reason to loosen credit reins.** He explained the current policy as based on the law of supply and demand, and warned that it is as unchangeable as the law of gravity. He pointed out that the law applies to all, and that concessions cannot be granted to some without hurting others. He indicated that housing has been "in a favored position" which, if continued, would hurt others.

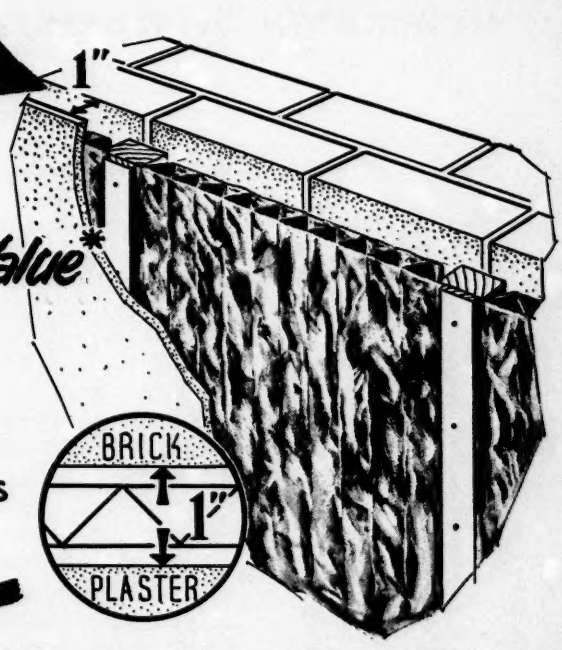
● Meanwhile, House Banking Subcommittee heard three organizations urge special attention to housing needs:

(Concluded on page 8)

HOW TO

Insulate Masonry Walls Get 2" Wall Insulation Value * *Create 1" Wall Space*

PROTECT WALLS OF BRICK, STONE, CONCRETE AND CINDER BLOCK AGAINST HEAT LOSS, HEAT INTRUSION, AND DAMPNESS AT ABOUT 8¢ SQ. FT. (Insulation and Labor)



*Wall-Heat Flow, U .089, C .15, R($\frac{1}{C}$) 6.66. Thermal factor tests by Armour Research Foundation with guarded hot plate laboratory technique. Insulation values calculated on basis of limiting values cited in Fed. Specs. LLL-f-321b; HH-I-585; HH-I-521c; HH-I-551a.

Insulate economically and effectively against heat and vapor flow in masonry construction, with 2 sheets of tough aluminum separated ½" apart by a flame, mold, and insect retardant accordion fiber. They install easily in one operation to furring strips. Only ½" deep installed, this insulation fits into the shallow 1" spaces created by the furring.

Comfortable areas can also be created in basements and other places in existing buildings for playrooms, storage, laundries, workshops, even living quarters; by this scientific construction of multiple aluminum and reflective spaces.

A MUST FOR SHALLOW SPACES

Cellar Walls	Air Ducts	Cold storage bins
Floor panels	Floors	Heated trucks
Airplanes	Ships	Prefab buildings
R.R. trains	Trailers	Freight cars
	Refrigerated trucks	

HEAT AND VAPOR FLOW RETARDED

With respect to radiant heat flow, the aluminum surfaces of this insulation have 97% reflectivity, and only 3% absorptivity and emissivity. Conduction is slight through the air spaces of low density. The layers of aluminum and fiber retard inner and outer convection. These comprise ALL methods of heat flow.

Because they are METALLIC and CONTINUOUS, the aluminum sheets are almost impervious to vapor flow. Infiltration under the flat flanges is slight. The possibility of condensation formation on or within this kind of insulation is minimized by the scientific construction of multiple layers of aluminum, fiber and air spaces.

This scientific insulation is commercially available as Infra Type 4 Jr. It has 4 reflective spaces, 2 outer, and 2 inner rows; and 4 reflective surfaces. Made for 16" centers, it is packed 500 sq. ft. to a carton in one continuous strip. It is also available with an asbestos partition.

HOW TO INSTALL

Attach 1" furring strips to walls on 16" centers. Tack flange of unopened Type 4 Jr. to *face* of furring strip with an occasional staple, bottom (flat) surface facing room. Expand insulation and tack to face of adjacent furring strip. Lap and tack flange of next piece of insulation *over* previously tacked flange of adjacent installed insulation. Nail rough lattice strip *over* combined flanges, which will prevent contact with subsequently installed lath or wall board, and create an additional air space.

The U.S. NATIONAL BUREAU OF STANDARDS has published an informative booklet describing the destruction which condensation can cause and means of preventing it. It is entitled "Moisture Condensation in Building Walls." Send us coupon for a FREE copy.

Get a FREE SAMPLE of this unusual insulation. Check the box in the coupon.

Infra Insulation, Inc.
525 Bway., New York, N. Y., Dept. V-4

Please send ☐ sample of Type 4 Jr.
☐ "Moisture Condensation in Building Walls."

Name_____

Firm_____

Address_____

WASHINGTON OVERTONES (*Concluded from page 6*)

● American Veterans Committee opposed any increase in interest rates for GI housing; favored allocation of up to $2½ billion from national life insurance trust funds for direct housing loans to veterans.

● **National Housing Conference reported tight money** "particularly harsh" on middle income groups; urged some relaxation of building rate is to be maintained.

● Cooperative League of the United States had three suggestions — small down payments for middle-income buyers, more economical financing, and increased authorization for second mortgage financing through Federal National Mortgage Association.

● Statistics supporting those seeking relaxed restrictions came from Bureau of Labor Statistics. BLS report showed February lowest in housing starts since 1949; 17 percent below corresponding month last year. For the first two months of this year, starts were down 15 percent to a seasonally adjusted basis of 910,000 annually — 200,000 below '56.

● "This alarming report," commented George S. Goodyear, President, National Association of Home Builders, "underscores the **need for emergency action by Congress** and the Administration now if homes are to be provided for American families of modest means.

● "Home builders and home buyers have been singled out for the imposition of the most discriminatory and unfair restrictions in the history of our free enterprise system, under the guise of anti-inflation controls."

● Other branches of the construction industry report more optimistically.

● Commerce Department and the Securities and Exchange Commission reported that expenditures for business plant and equipment in 1957 will reach $37.5 billion — $2 billion more than last year. Commercial construction, however, will be down six percent, their estimates show.

● Associated General Contractors new President Lester Rogers forecast on March 14 that 1957 will be the biggest year in the history of the heavy construction industry.

● Medical and dental schools would start a five-year program involving $477 million in construction if federal funds were available, the House Commerce Committee was informed. Another $50 million in construction is planned by osteopathic colleges and public health schools.

● House Appropriations Committee actions in mid-March indicate that **some members of Congress do not favor curtailing construction aids.** Committee was giving serious consideration to between $350 millions and $500 millions in direct appropriations for public buildings. The program would replace the lease-purchase program discontinued during February by the Administration as an anti-inflation measure.

● Growing importance of air conditioning in official thinking is evidenced by two recent Washington events:

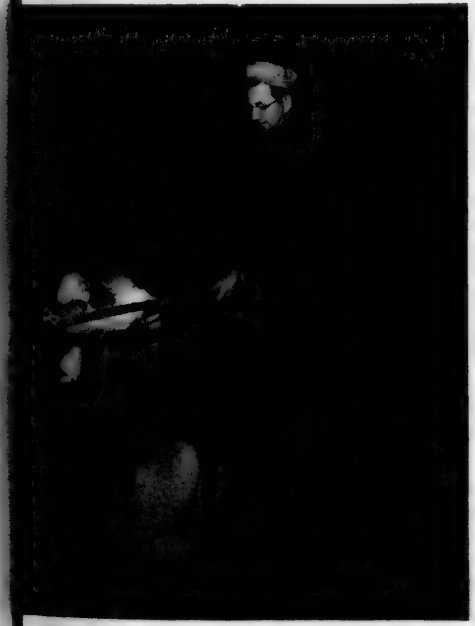
● One, April 3-4, is the government-industry **symposium on air-conditioning** at the Commerce Department auditorium. Symposium was arranged by joint government-industry committee at recommendation of Air-Conditioning and Refrigeration Industry Business Defense Advisory Committee. A dozen government representatives, and a similar number from industry were to participate in the program, with several hundred expected to attend.

● Second Washington bow to air conditioning was the announcement by General Services Administration, of awarding of contracts for $11 million worth of **air conditioning systems for six government buildings** in Washington, Baltimore, Newport News and Lynchburg, Va. Largest was the $6 million project to air condition Department of Agriculture buildings in Washington.

● Within 25 years, coal will replace petroleum and natural gas as a fuel for generating electricity, according to Mines Bureau Director M. L. Ankeny. Approximately 30 percent of the fuel for generating electric current is involved. The Mines Bureau Director forecast that oil and natural gas would be upgraded in price to a point beyond the economic range of producers of electricity. Possibility of building generating plants near mine sites, and transporting only the current to points of use, was also foreseen.

52,000 feet of wrought iron pipe provide built-in protection against corrosion for ice skating rink at new Kentucky Fair and Exposition Center, Louisville.

Ten miles of Wrought Iron Pipe checks corrosion at this ice skating rink



Testing of 3,500 welds in this wrought iron rink piping revealed only two leaks.

Carrying brine for ice skating rinks is one of the most corrosive services a piping material can encounter.

To check corrosive attack in this service at the Kentucky Fair and Exposition Center's Coliseum at Louisville, designers specified 52,000 feet of 1-inch wrought iron rink piping. This time-tested material was also installed in the Center's condensate returns, pump discharge and high pressure and medium pressure return lines.

Wrought iron's glasslike silicate fibers provide built-in resistance to corrosive agents. This exclusive protection—found only in wrought iron pipe—checks premature piping failure, abnormal maintenance and excessive repairs. No protective coatings are needed either.

Service records document wrought iron's qualifications for this service. Many of these case histories are covered in our Special Report, *Ice Skating Rinks—Their Construction and Maintenance.* Write for your copy today.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Division Offices in Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. International Division: New York, N.Y.

Available in Canada and throughout the world

Kentucky Fair and Exposition Center Ice Skating Rink
Architects: Fred Elswick and Associates, Louisville
Contractor: Ward Refrigeration and Engineering Company, Louisville
Mechanical Engineers: E. R. Ronald and Associates, Louisville

BYERS Wrought Iron Tubular and Hot Rolled Products

ALSO ELECTRIC FURNACE QUALITY STEEL PRODUCTS

BRIEFLY STATED

• **Ralph L. Goetzenberger** of Washington, D.C., a vice president of Minneapolis-Honeywell Regulator Co., for the past 22 years, has resigned upon reaching the voluntary retirement age of 65. Mr. Goetzenberger will be retained as an educational consultant to assist in the firm's activities with colleges, professional societies and technical groups.

• **Philip Borkat,** formerly chief engineer of Viking Air Conditioning Corp., has been appointed general manager of Arklon Manufacturing Co., Cleveland, Ohio.

• **Lawrence P. Roth,** former president of Refrigeration Supply, Inc., has recently joined **Recold Corporation** of Los Angeles. Mr. Roth will be working in the research and development section of the Engineering Department for the Los Angeles firm.

• The appointment of 10 new agents to market Isotron refrigerants in the East and Midwest has been announced by **Pennsalt Chemicals,** Philadelphia. Under the direction of Sales Supervisor Arnold E. Blitz, the newly appointed representatives will handle a full line of the company's refrigerants for the air conditioning and refrigeration fields.

• Seven sales representatives have been named by **Carrier Corp.,** Syracuse, N. Y., to handle the company's line of unit heaters, heating and ventilating equipment: Bryce Byard of Harry Wright Jr. and Associates, Cincinnati, Ohio; Richard C. Nye of Harry Wright Jr. and Associates, Marietta, Ohio; Mecha-line Co., Oklahoma City, Okla.; Frontier Engineering Services Co., Salt Lake City, Utah; Jim Marshall Engineered Sales Service, San Antonio, Tex.; R. Dykstra and Co., Grand Rapids, Mich.; and Paul N. Stack Sales Co., Charlotte, N. C.

• Three promotions from within the sales department of Chase Brass & Copper Co., Waterbury, Conn., a subsidiary of Kennecott Copper Corporation, were announced. All changes will be effective May 1. Involved are **Leland S. Hanson,** eastern regional sales manager who steps up to the position of executive sales director; **Charles A. Festge,** currently district manager at Milwaukee, Wis., who will succeed Mr. Hanson; and **Edward J. Finn,** of the general sales department in Waterbury, who will succeed Mr. Festge as district manager at Milwaukee.

• **Frederick M. Jackson** has been named vice president in charge of sales for Walworth Company, New York, N. Y. **George E. McDonald** has been appointed vice-president and treasurer. The latter has been with the firm since 1925, the former since 1926.

• **John F. Myers,** vice president of the Westinghouse Electric Corp., Pittsburgh, Pa., has been appointed general manager of the company's marketing subsidiary, Westinghouse Electric Supply Company.

• At the 13th annual meeting of The Magnesia Insulation Manufacturers Assn., **Alvin M. Ehret, Jr.,** president of Ehret Magnesia Mfg. Co., was elected Chairman of the Board of Governors succeeding **Ernest Muehleck,** president of Keasbey & Mattison Co. Mr. Muehleck had held the office since the association was formed in 1944.

• **James L. Sheehy** has been appointed district manager of the western area recently established by Tube Turns Plastics, Inc., Louisville, Ky. Mr. Sheehy will make his headquarters in San Francisco.

• **Borg-Warner Corp.,** Chicago, Ill., announced it has consolidated its Hydraline Products Division in Detroit, Mich., with its recently acquired York Division in York, Pa. Under the consolidation, York will expand its manufacturing program to include a new line of York-Hydraline air conditioning products.

• **Gray Worthington** has been named regional sales manager of Rolled Steel Corp., Chicago, Ill., warehousers of sheet steel and galvanized products. Mr. Worthington's territory is Illinois, Iowa, Missouri, and Tennessee.

• **Carl F. Johnson,** a director of Johnson Service Co., Milwaukee, Wis., since 1912, died February 2 at his home in Altadena, Cal. He was 78 years old. Mr. Johnson was the son of the late Warren S. Johnson, inventor of the thermostat and founder and first president of the company. Graduated from Massachusetts Institute of Technology in 1901, he went to work immediately for the company in its New York offices. He later became vice-president and plant superintendent at the company's Milwaukee headquarters where he took part in the development of the steam-powered Johnson automobile and truck, said to be the first motor truck used by the United States postal service. He also invented a pneumatic clock system and many devices used in the pneumatic control field.

• New executive vice president, operations, of American Radiator and Standard Sanitary Corp., Pittsburgh, Pa., is **John C. Linsenmeyer.** He will be in charge of a group of operating divisions producing industrial and engineered products. Formerly president of the American Blower and Ross Heat Exchanger Divisions of the corporation, he is succeeded by **John W. Brennan,** who was named president of the American Blower Division, and **Richard S. Reade,** who was appointed president of Ross Heat Exchanger Division.

• **Robert C. Blatt,** former director of publications for the American Society of Refrigerating Engineers and editor of *Refrigerating Engineering,* has joined the Industrial Publicity Department of Communications Counselors, Inc., New York, N. Y. Blatt has been an editor on such magazines as *Electrical World* and *Airports and Air Carriers,* chief airport lighting engineer for the Civil Aeronautics Administration, and long served as electrical engineer for the Municipal Architect of the District of Columbia.

(Concluded on page 12)

New edition now ready!

The Standard Source of Specification Data for Storage Water Heaters

P-K's new tab indexed catalog has all the information required for architects, consulting engineers and contractors to select and specify storage water heaters. Included are individual sections on plain steel, copper-lined, copper silicon, cement-lined heaters, etc. together with detailed installation data.

Tear out the coupon and attach it to your business letterhead!

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storage water heaters • instantaneous heaters • converters
fuel oil heaters • freon chillers and condensers

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940 Burson Street, East Stroudsburg, Pa.

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BRIEFLY STATED

(*Concluded from page* 10)

• Wheelco Instruments Div., Barber-Colman Co., Rockford, Ill., announced the following appointments: **Harold Dirkers,** branch manager of the St. Louis office; **Howard Berger,** manager of the Cleveland office; and **Stanley Hanson,** manager of the Detroit branch.

• **Reznor Mfg. Co.,** Mercer, Pa., maker of gas unit heaters, announced its purchase of the assets of **Arthur A. Olson & Co.,** Canfield, Ohio, manufacturers of stainless steel direct-fired gas and oil heaters. The purpose of the acquisition is to expand the company's line into units of larger capacities. **Arthur Olson** and **Edwin Runge,** officers of the Olson company are joining the Reznor staff.

• **Dunham-Bush, Inc.,** has acquired the assets of **Brunner Mfg. Co.,** Utica, N. Y. Stockholders of both companies met in West Hartford and Utica and endorsed the action previously taken by the boards of directors. Brunner Mfg. Co., at Utica, will be operated as The Brunner Division of Dunham-Bush, Inc., and The Brunner Company, at Gainesville, Ga., will be a wholly-owned subsidiary of Dunham-Bush, Inc.

• A sales office to serve metropolitan New York customers has been opened by **Automatic Devices Co., Inc.,** of Western Springs, Ill. The company, which manufactures heating system controls that are activated by outside temperatures, has appointed **Donald F. Horan** to manage the New York City office.

• **Freon Products Division** is the new name for Kinetic Chemicals Division, Organic Chemicals Department, E. I. du Pont de Nemours & Company, Wilmington, Del. The old name was acquired with the acquisition in 1950 by du Pont of 20-year-old Kinetic Chemicals, Inc. "Kinetic" was never used as a trademark.

• Worthington Corporation's Holyoke, Mass., Division has announced the appointments of **George W. Hartwell** as chief engineer, commercial refrigeration equipment, and **Henri Soumerai** as chief engineer, refrigeration compressor development, Air Conditioning and Refrigeration Division.

• The boards of directors of **United States Air Conditioning Corp.,** Philadelphia, Pa., and **Hughes-Keenan Corp., Delaware,** Ohio, announced agreement to **merge** subject to stockholder approval. The former produces air conditioning, heating, and ventilation products. The latter company makes cranes for industrial and railroad use and light truck bodies.

• **Charles W. Lockhart** is appointed sales manager of Blower and Air Conditioning Div., Buffalo Forge Co., Buffalo, N. Y. He has been with the company since receiving his B.ME. from Cornell University in 1936, except for four years duty with the Air Force from which he was discharged in 1945 with the rank of Lieut. Colonel.

• **Meyer Evanson** has been appointed coordinator of commercial heating for Crane Co., Chicago, Ill. He will act as a coordinator and consultant in the application of the company's line of heating products for the commercial market.

• Assumption of the administrative responsibilities of the entire Eljer Div., The Murray Corporation of America, Pittsburgh, Pa., by newly appointed Vice-President **J. J. Lane** was announced. Mr. Lane resigned as partner of Stevenson, Jordan and Harrison, Inc., management consultants, to accept the position.

• Acme Industries, Inc., Jackson, Mich., has announced the appointment of **Walter M. Hassenplug** as vice-president, director of engineering. He had been with Ingersoll-Rand, Carrier, and GE's Air Conditioning Division before joining Acme.

• **Marlo Coil Co.,** St. Louis, Mo., has announced the appointment of **Friemel-Love Company** as sales representative for the company's line of air conditioning and heat transfer products in the St. Louis, eastern Missouri and southern Illinois territory.

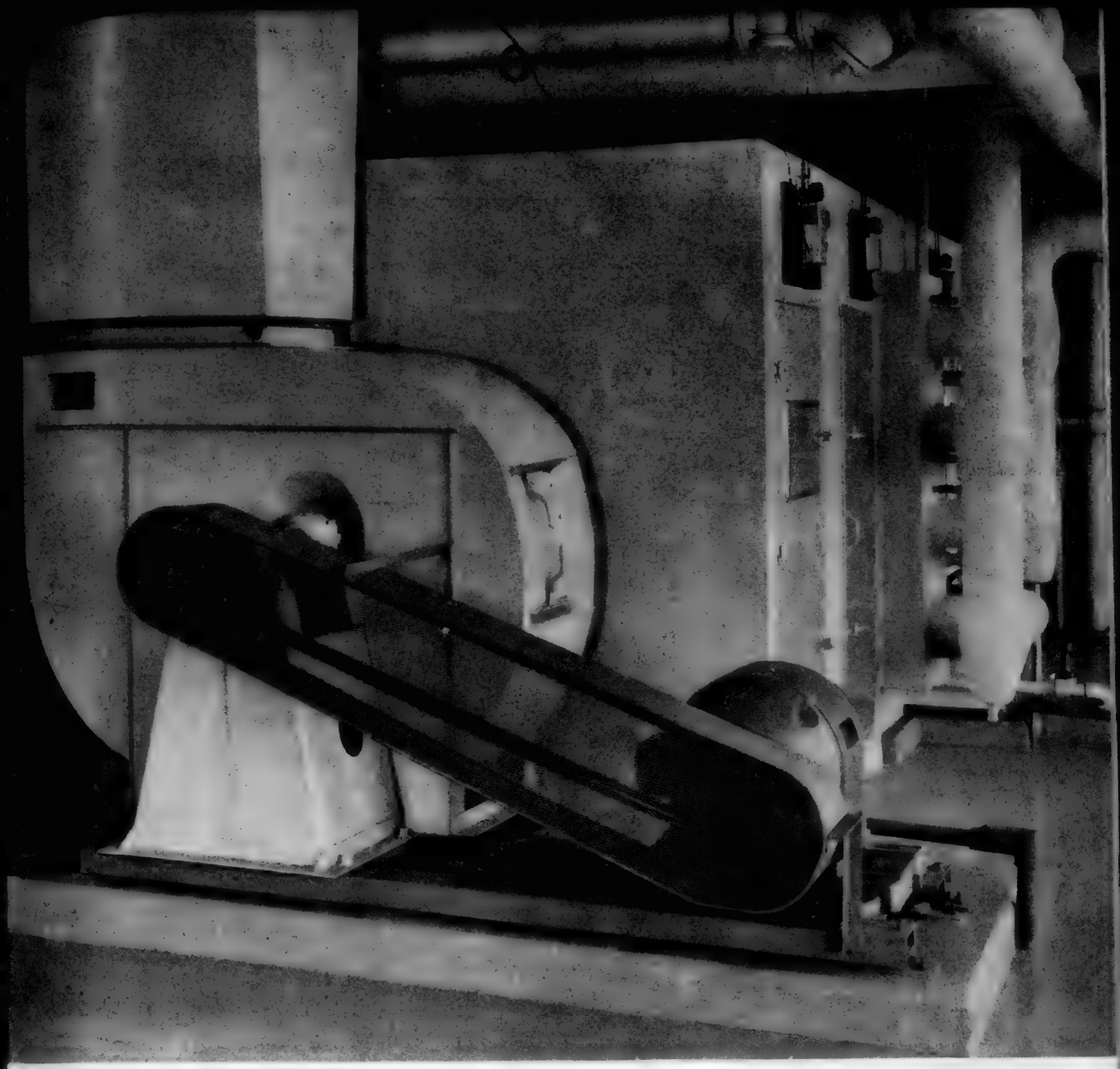
• **Austin Rising** has been named vice president in charge of marketing services for the York Division of Borg-Warner Corp., York, Pa. He will be chiefly concerned with strengthening the firm's marketing setup which will be geared to fit a proposed broadening of the firm's scope in the manufacturing field which will include several new products.

• **Reading Tube Corp.,** Reading, Pa., has completed arrangements to acquire **Mackenzie Walton Co.,** Pawtucket, R. I. Mackenzie Walton, since 1909, has specialized in the manufacture of non-ferrous seamless tubing for instruments, gauges, pressure controls and recording equipment.

• Appointment of **William G. Smith** to the post of service manager for Air Conditioning Div., National-U. S. Radiator Corp., Johnstown, Pa., was announced. He will be in charge of national field servicing of the company's Capitolaire and Unarco air conditioning lines, with headquarters at the new Central Service Repair Depot in Greenville, Ill.

• Appointment of **Norman R. Gay** as staff engineer is announced by Bendix-Westinghouse Automotive Air Brake Co., Elyria, Ohio. Mr. Gay joins the company after 15 years association with the refrigeration, air conditioning and heating industries. During this period he served jointly as associate professor at Cornell University and as research consultant to air conditioning manufacturers.

• **H. C. McDaniel** has been named director of technical information for the Westinghouse Electric Corp., Pittsburgh, Pa. At the same time, **Robert V. McGahey** was appointed manager of technical publicity for the company. Mr. McDaniel, formerly manager of technical information, will continue to supervise activities of both the technical publicity department and the Westinghouse *Engineer* magazine.



IT'S
INSTALLED PERFORMANCE
THAT COUNTS

— and that's exactly what "Buffalo" Type "BL" Fans are delivering in hundreds of major installations

Since their introduction four years ago, many thousands of these Type "BL" Fans have gone into industrial, commercial and institutional jobs to justify every performance claim — and then some! In this time, they have demonstrated their low noise level in hospitals — their endurance and efficiency in heavy-duty industrial applications — their stability under broad variations of pressure and volume requirements. In short, "BL" has proven over and over to be the wise choice for the big Class I air handling jobs.

Check the "Q" Factor* design of the "BL" that assures this top performance — write today for Engineering Bulletin F-101.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

Dependable air handling service on central system air conditioning is assured by "Buffalo" Type "BL" Fans. Non-overloading, low in noise level and stable over the entire operating range.

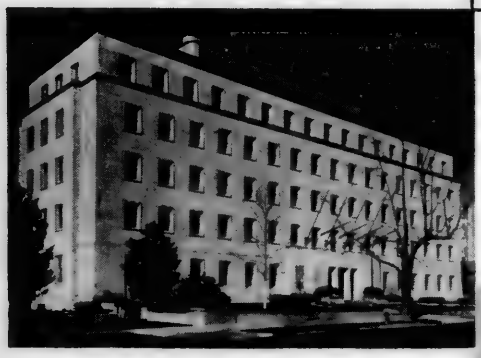
"Buffalo" Type "BL" Limit-Load Fans supply efficient, reliable ventilation for many of Florida's finest "Gold Coast" resorts, as well as large plants and institutions everywhere.

BUFFALO FORGE COMPANY
BUFFALO, N. Y.

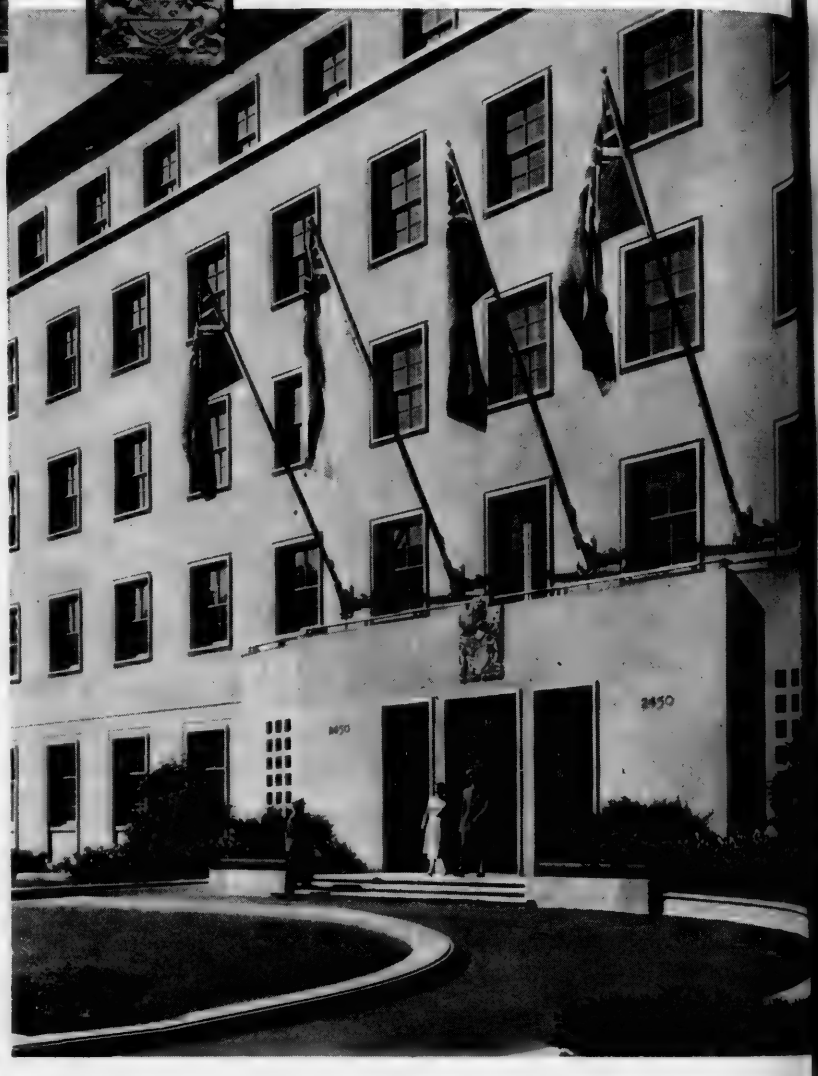
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

...ILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING

POWERS Control provides



CANADIAN JOINT STAFF BUILDING
Washington, D.C.



Architects:
Marani and Morris, Toronto, Ont.

Associate Architects:
Faulkner, Kingsbury and Stenhouse
Washington, D.C.

Mechanical Engineer:
Charles S. Leopold, Philadelphia, Pa.

Mechanical Contractor:
W. G. Cornell Co., Inc., Washington, D.C.

Primary air supply regulated by Sub-master Thermostat and Powerstroke damper motor.

Far Right: Powers Master Control Panel

Electronic Solar Sensing Instruments on roof of building

→

(c86)

ideal comfort in Canada's Washington "Pentagon"

This imposing new structure on Washington's Embassy Row, houses offices of the Canadian Joint Staff and Department of Defense Production. An atomic bomb shelter here provides working facilities for key personnel in time of an emergency. Teletype lines from the communication room link the building with both the U.S. Pentagon and Ottawa. A Powers modern control system maintains the proper air conditioned "climate" so essential for people making vital decisions. It also insures efficient operation of heating and air conditioning equipment.

Economy in Refrigeration Horsepower achieved here. Conditioned primary air is supplied to 199 perimeter induction air conditioning units. Cooling for four exterior zones is automatically established by Powers electronic type solar equipment which measures solar gain on each exposure of the building. Operating in conjunction with a Master outdoor temperature thermostat, this equipment establishes the highest allowable temperature to meet load conditions. This control results in maximum economy of refrigeration horsepower. Perimeter induction units are individually controlled by Powers thermostats and packless valves.

Interior areas are supplied with conditioned air which is reheated as required by 23 booster coils individually controlled by Powers thermostats and packless valves. Temperature of forced hot water for the booster coils is controlled by a Powers Mastrol system.

Are You Planning a New Building or modernizing an old one? If so, ask your architect to include a Powers Quality system of temperature and humidity control. They have been time-proven dependable and more economical in thousands of prominent buildings since 1891.

THE POWERS REGULATOR COMPANY

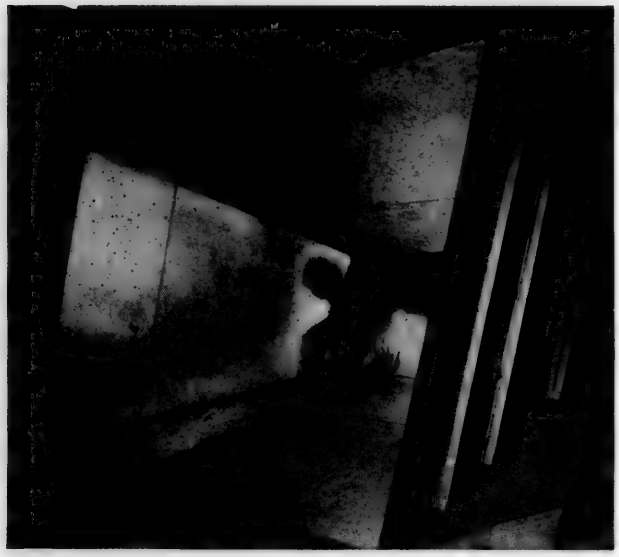
SKOKIE, ILLINOIS | *Offices in Chief Cities in U.S.A., Canada and Mexico*

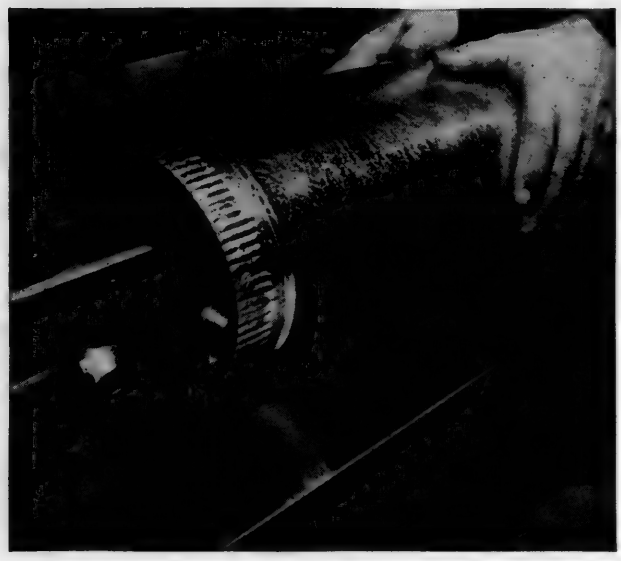
65 Years of Automatic Temperature and Humidity Control

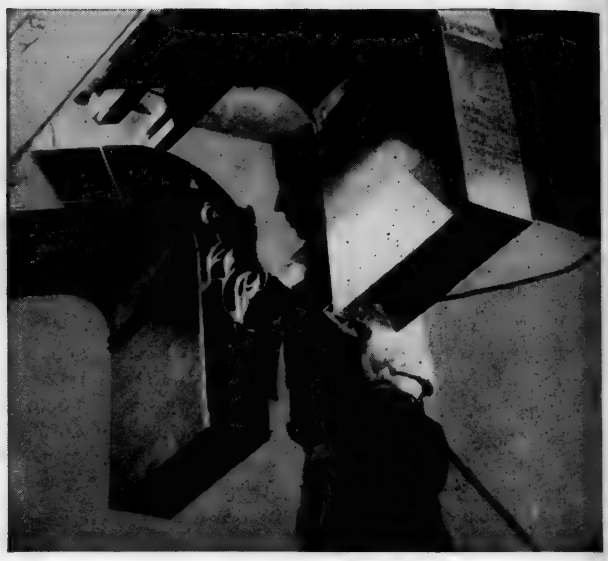
Vortex damper operated by Powerstroke Motors regulated by Powers Static Pressure Control

Powers controls on domestic hot water supply

Powers MASTROL system for forced hot water heating







Bethcon takes severe forming without flaking or cracking

Put a sheet of Bethcon through the toughest operations in your shop, then cast a critical eye over the galvanized finish. Any cracking, peeling, flaking?

Not on a Bethcon sheet! That's because in Bethlehem's continuous galvanizing lines the zinc is bonded much more tightly to the base metal than in the conventional hot-dip method. Thus, even when the sheet is doubled back on itself, the coating remains as sound as ever.

Bethlehem's continuous galvanizing process also imparts another advantage to Bethcon. It produces a sheet that is just soft enough for easy working, yet rigid enough to provide the strength you need in the finished product. Nowhere is this combination of qualities more important than in the fabrication of ductwork.

You can specify Bethcon in cut lengths or coils, 13-gage or lighter. You can also choose between carbon steel and corrosion-resisting Beth-Cu-Loy (copper bearing steel) for the base metal. For additional information about Bethcon sheets just get in touch with the nearest Bethlehem office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Ilg LSQ Power Roof Ventilators have the low silhouette you want for modern buildings . . . and a great deal more. Quiet, trouble-free operation is assured by a direct-connected Ilg motor with permanently lubricated ball bearings, exclusively for fan use. All-aluminum housing never needs painting. PFMA label certifies all ratings. For East End School, Burlington, N. C., The Man from Ilg recommended two large LSQ's for the auditorium, a smaller one for the kitchen dishwasher. The Man from Ilg is ready to work for you . . . call on him to help you plan any ventilating installation for peak efficiency and lowest final cost.

ILG ELECTRIC ILG **VENTILATING CO.**

2851 N. Pulaski Rd., Chicago 41, Ill. Offices in 56 Principal Cities

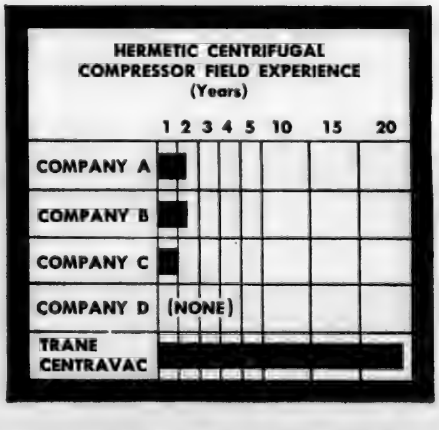
SEND FOR ILLUSTRATED "SCHOOL" CASE STUDY

East End Elementary School, Burlington, N. C., and Phillis Wheately Elementary School, New Orleans, La., both obtain quiet, efficient ventilation—at lowest final cost—with Ilg equipment. Request Bulletin No. 5.

19 years of proven
behind every Trane

INSTALL IT ANYWHERE!

Basement to penthouse, the TRANE CenTraVac fits in anywhere. And you don't need heavy concrete supports or multi-level bases. Complete range of sizes from 45 to 800 tons; duplex models to 1,500 tons.



COLD GENERATORS. Package water chillers from 10 to 150 tons capacity. 4-step compressor modulation cuts power consumption. Complete factory pre-assembly includes automatic control panel.

field performance
CenTraVac water chiller

For job-tested dependability, specify the industry's first hermetic centrifugal

There are *nineteen solid years* of practical field experience built into the TRANE CenTraVac water chiller for 1957! And this proven field performance is your best assurance of sound engineering . . . long years of trouble-free operation.

Since 1938—when the first TRANE centrifugal hermetic was installed—TRANE has refined . . . improved . . . perfected . . . tested these water chillers until now, for 1957, TRANE offers the most dependable units ever built!

Efficient capacity control! Separate control of *both* stages of compression assures minimum power consumption under *all* part load conditions. The TRANE CenTraVac water chiller automatically throttles down to 10% of capacity. Actual installations show many instances of capacity control down to 5%—and even lower!

Extensive published ratings! The TRANE CenTraVac for 1957 is based upon 19 years of continual laboratory testing of *complete machines*—certified in years of field performance. And TRANE offers you the most extensive published ratings and data available for machine selection. (The CenTraVac is flexible, too—may be installed with any type of pneumatic or electronic-pneumatic control system.)

Low noise level! The TRANE CenTraVac water chillers have been successfully installed next to conference rooms . . . libraries . . . executive offices. You can specify a CenTraVac with confidence that you are getting the *quietest* equipment of this type. This quiet operation is another indication of the advanced engineering built into the TRANE CenTraVac!

For your next refrigeration job, make it a TRANE CenTraVac—the industry's *first* hermetic centrifugal, *and the best!* For complete facts, call your nearby TRANE Sales Office, or write TRANE, La Crosse, Wisconsin.

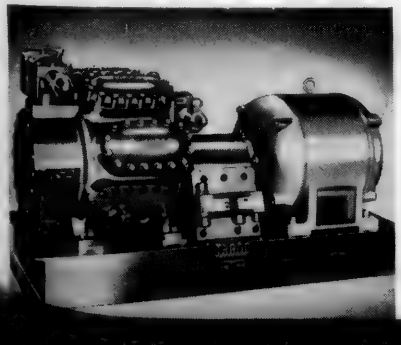
For any air condition, turn to

TRANE

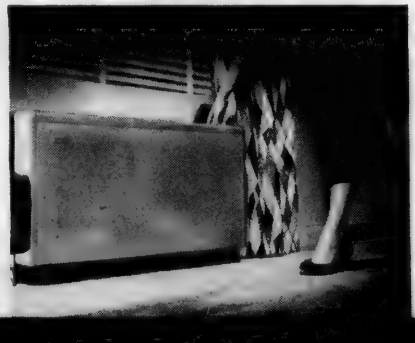
MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS. • EASTERN MFG. DIV., SCRANTON, PA. • TRANE COMPANY OF CANADA, LTD., TORONTO • 90 U.S. AND 19 CANADIAN OFFICES

RECIPROCATING COMPRESSOR. Dependable multi-step capacity control reduces starting and stopping. Exclusive cadmium-plated valves last up to 800% longer than steel! Capacities from 10 to 50 tons.



UNITRANE UNITS. Individual room air conditioners in Fan-Coil (illustrated) or Induction models provide for filtering all the air—not just primary air. Floor models, ceiling models and concealed units.



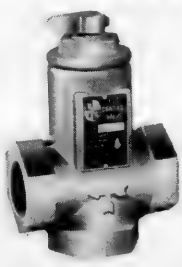
CLIMATE CHANGER. Solves air handling problems faster, easier. Factory *pre-assembled* units are sectionalized, more accessible. New fan assembly gives you a variety of discharge patterns. 600 to 29,000 cfm.

Motels make B & G *Hydro-Flo* HOT

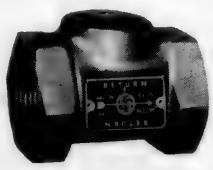
ONLY **WATER** OFFERS ALL **5**

- Comfort heating
- Summer cooling
- Hot faucet water
- Zone control
- Snow melting

Everything for heating and



B&G Flo-Control Valve
Helps keep indoor temperature uniform.



B&G Monoflo Fitting
Permits use of single main—cuts piping cost.

B&G Relief Valve
Protects boiler against excessive pressure.

WATER HEATING the key to full occupancy

Motel owners everywhere are making a strong point of "Radiant Hot Water Heat" as the final luxury touch to today's fine motor court accommodations.

The same features which make forced hot water heating alluring to travelers can be applied as a distinguishing mark of genuine quality to any home!

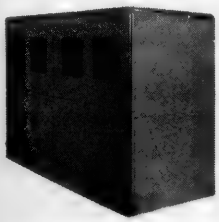
B&G *Hydro-Flo* Forced Hot Water Heating offers all the superior comfort advantages of *radiant* heat. Sunny warmth so smoothly controlled that every change in the weather is met with a corresponding change in the heat supply. No over heating—no under heating—no drafts—no fuel waste! And a year 'round supply of hot faucet water—always plenty for automatic washing appliances.

Now add these *plus values*, which can be included when building or at any time thereafter...zoning for different temperatures in different parts of the house...snow melting...and summer cooling in a manner which makes no compromise with the best in heating.

Builders of homes in every price bracket are capitalizing on the distinction offered by the B&G *Hydro-Flo* System. Write for the new 4-color booklet which shows why "Only Water Offers All Five."

B&G BOOSTER
The B&G Booster Pump is the key unit in a B&G *Hydro-Flo* System. Quiet, dependable, long-lived... over 2,000,000 have been installed to date.

cooling with water



B&G Package Water Chiller
for summer cooling systems.

B&G snow melting heat exchanger
Connects to same boiler that heats the house.

*Reg. U. S. Pat. Off.

BELL & GOSSETT
COMPANY
Dept. ET-4, Morton Grove, Illinois
Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto, Canada

True Automatic Air Conditioning–

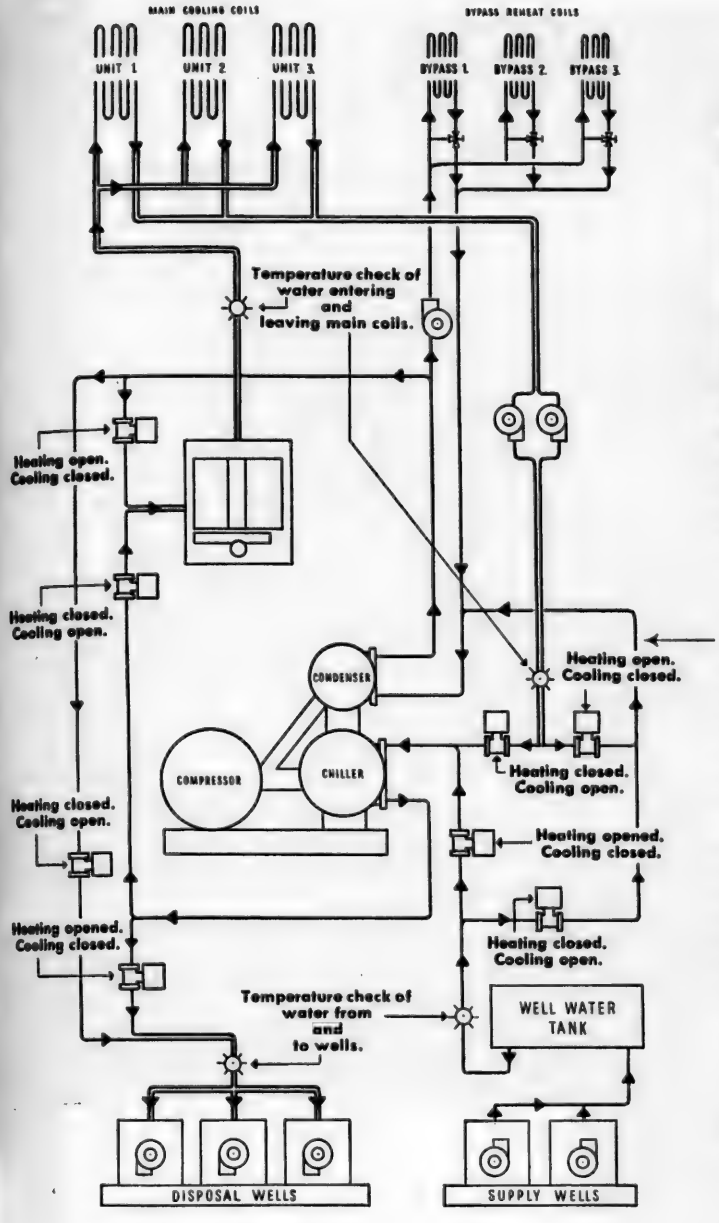
Architect: Eliot C. Fletcher, Tampa;
Engineer and General Contractor:
Stone & Webster Engineering Corporation of Boston;
Air Conditioning Contractor:
Tampa Armature Works, Inc., Tampa

INSTALLATION of the Honeywell Supervisory Data Center in the new Tampa Electric Company building lobby illustrates well how central control can be used with a 200-ton centrifugal refrigerating system that furnishes both heating and cooling.

Temperatures in 17 large public zones can be read and adjusted quickly at the panel; a locked glass cover prevents tampering.

Individual room thermostats in private offices give each occupant personal temperature selection.

In addition, operation of the entire heat pump system can be checked at any time at the panel. A miniature instrument allows output of the refrigeration compressor to be noted and adjusted.



New use for electric power—heating and cooling with a heat pump—is demonstrated dramatically by prominent display of the Supervisory DataCenter control panel in the lobby of the Tampa Electric Company building.

Heat pump operation. Tampa Electric Company heat pump system has three water circuits. (1) A circuit from the supply wells through the chiller (heating cycle) or condenser (cooling cycle) to the disposal wells. (2) A closed circuit from the main cooling coil to the condenser (heating cycle) or the chiller (cooling cycle). (3) A circuit from the condenser (cooling cycle) to the bypass reheat coils. During cooling cycle, water from the wells passes through condenser where it picks up heat. This warmer water then returns to the disposal wells. Water from main cooling coils is cooled by the chiller in a closed loop. During heating cycle, water from the wells gives up heat in the chiller and this cooler water is returned to the disposal wells. Water from the main coils is heated by the condenser in a closed loop. The difference in the temperature of the water entering and leaving the main cooling coils is a measurement of the heat being removed or added to the circulated air. The difference in the temperature of the water leaving and returning to the wells is a measurement of the amount of heat being removed from or added to the well water. The output of the compressor is controlled by a Honeywell miniature indicating-controller to maintain a temperature of 45° for cooling and 105° for heating of the supply water for the well coils. For further explanation of system operation, refer to notes on diagram at left.

...with Honeywell Supervisory DataCenter

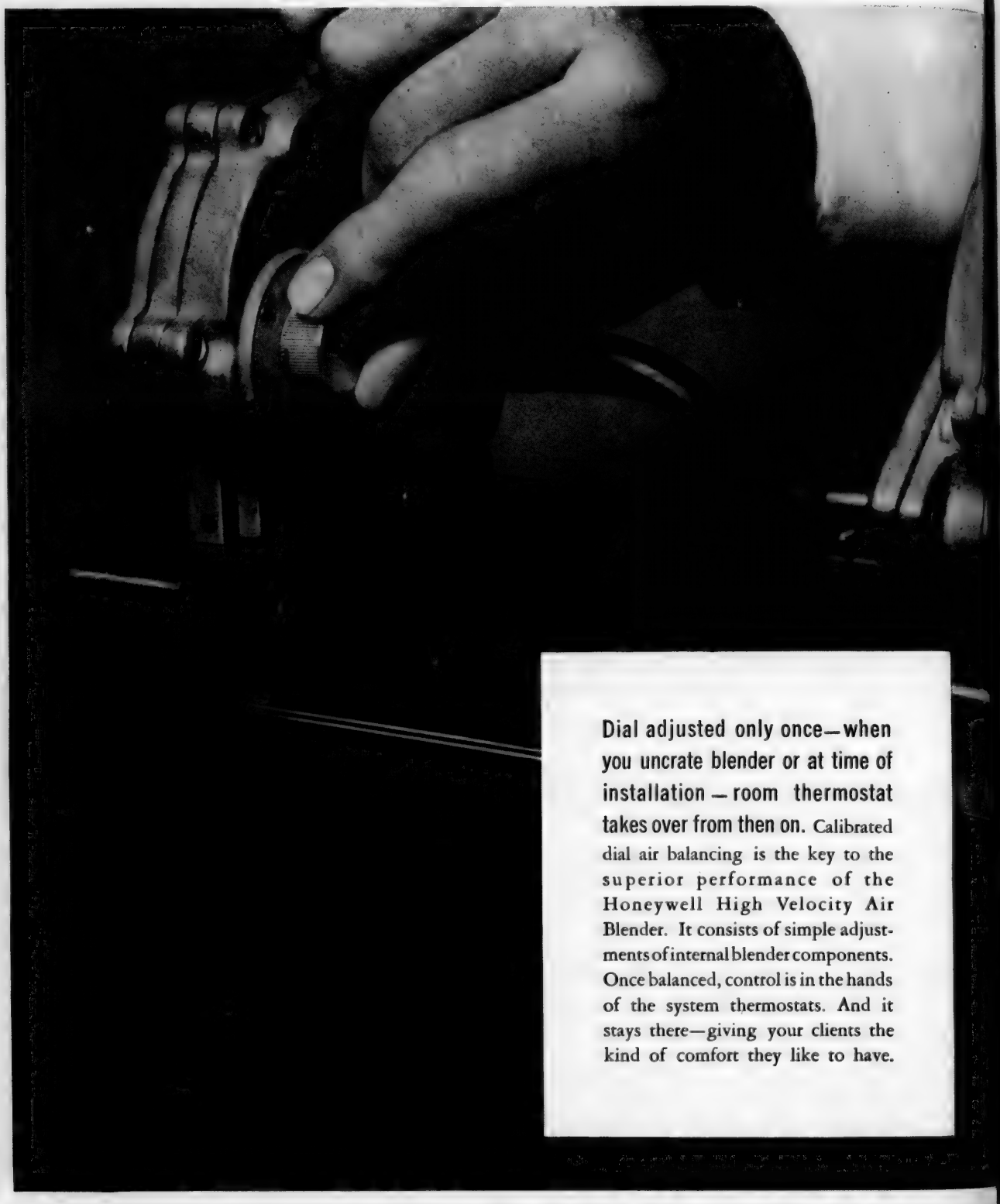
Greater operating efficiency with less personnel time . . . longer equipment life . . . operational savings that liquidate cost . . . attractive display of your engineering design—all this can be accomplished with the centralization made possible by the Honeywell Supervisory DataCenter. More than 100 of these installations are now in operation throughout the country.

All components of the DataCenter are manufactured by Honeywell. And *only* Honeywell manufactures pneumatic, electric and electronic controls and instruments.

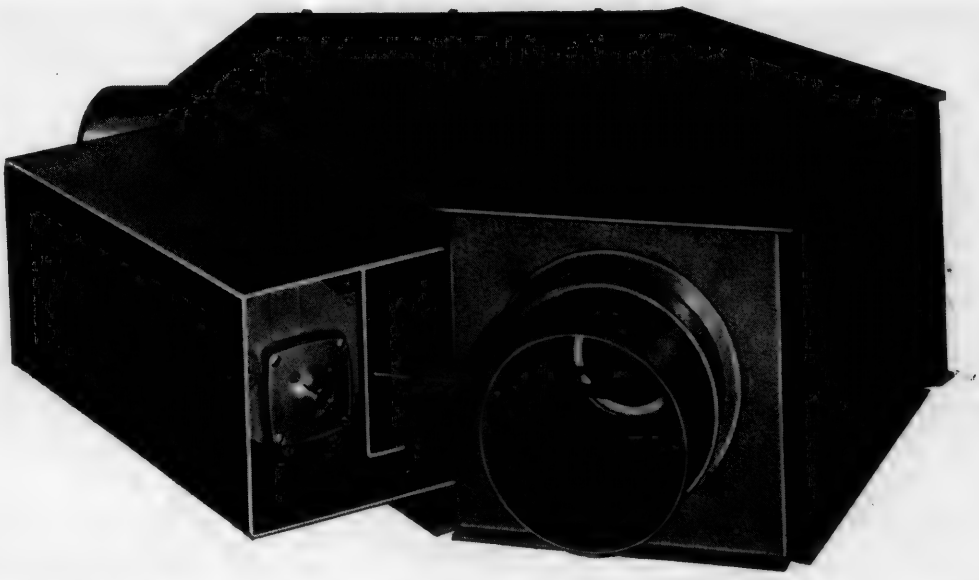
For further information about the DataCenter and other Honeywell control concepts, call your local Honeywell office. Or if you prefer, write to Minneapolis-Honeywell, Dept. HV-4-143, Minneapolis 8, Minnesota.

For news about another major Honeywell contribution to air conditioning, turn the page.

Control leadership through advanced engineering-research



Dial adjusted only once—when you uncrate blender or at time of installation—room thermostat takes over from then on. Calibrated dial air balancing is the key to the superior performance of the Honeywell High Velocity Air Blender. It consists of simple adjustments of internal blender components. Once balanced, control is in the hands of the system thermostats. And it stays there—giving your clients the kind of comfort they like to have.



How blender works. This is the packaged blender for conventional installation. Other configurations available for special installations. From it, whatever the form, you and your clients can expect controlled volume of air, constant CFM, long valve life and simplified control. The thermostat in the Air Blender System controls temperature by controlling the volume of hot air passed by the hot duct. At the same time a flow regulator provides a constant hot air volume for a given thermostat signal under variations in supply duct pressures. A constant total flow is provided by a total flow regulator which operates the cold air valve to make up the difference between hot flow and desired total flow.

Dial Air Balancing

New Honeywell Air Blender Solves Dual-Duct High Velocity Distribution Problems

Provides constant delivered air volume, needs no recalibration when you add to system

WITH THE new Honeywell Air Blender your clients get the level of comfort they want —on the simple call of the room thermostat.

They get this easily, because the Honeywell Air Blender combines temperature and volume control in one unit.

And comfort doesn't come at the expense of some other room. It comes from the system. *One room no longer "robs" another of comfort.*

Besides providing constant delivered air volume, the Honeywell Air Blender takes well to change. With Dial Air Balancing you can add to the system without having to recalibrate distribution points that may be scattered widely—especially valuable in floor by floor modernization or on new construction.

Self-powered, the Honeywell Air Blender uses the air pressure of the high velocity air it is controlling to actuate the diaphragm—its only moving part. Such simplicity makes possible long life and trouble free performance.

For further information about the Honeywell High Velocity Air Blender and other Honeywell heating and air conditioning products, call your local Honeywell office. Or write to Honeywell, Dept. HV-4-143, Minneapolis 8, Minnesota.

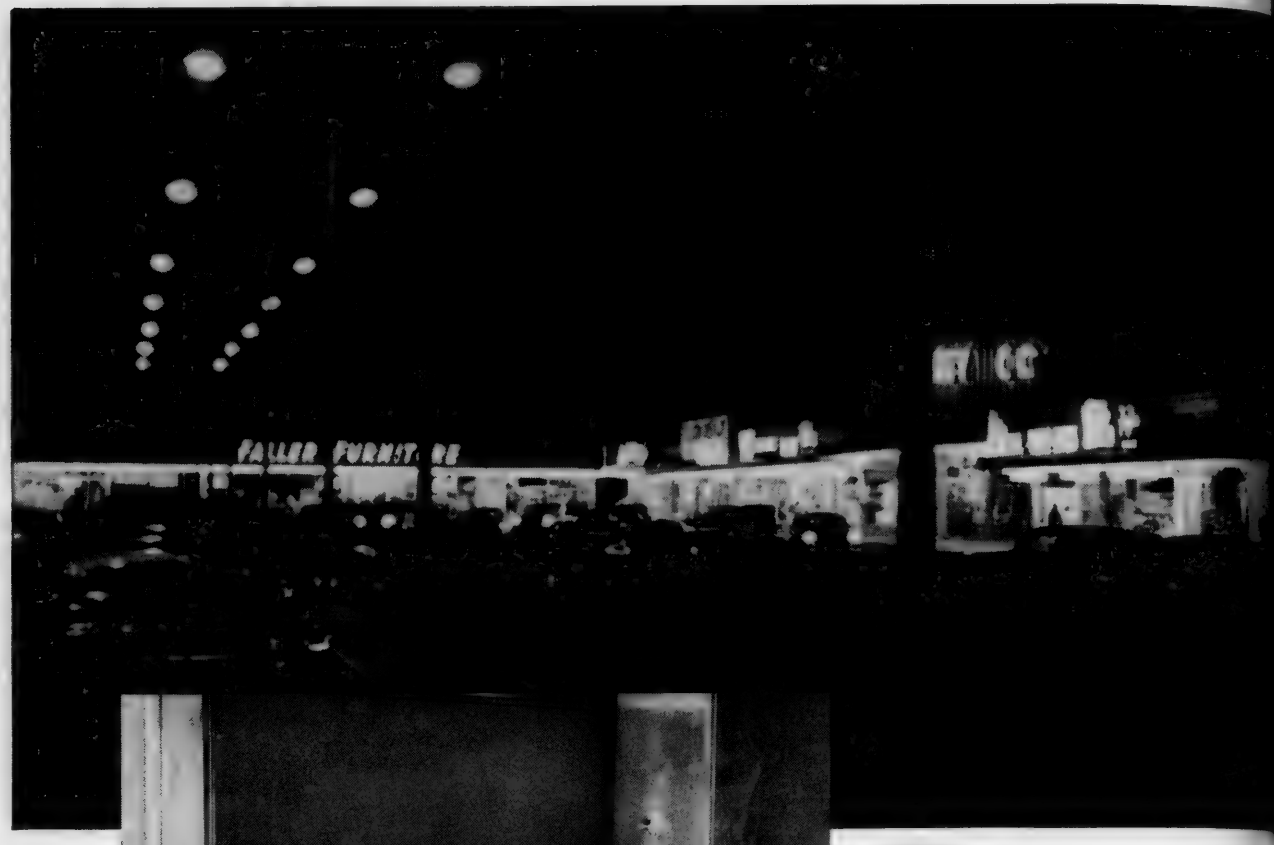
Room thermostat—
the ***Honeywell Round***

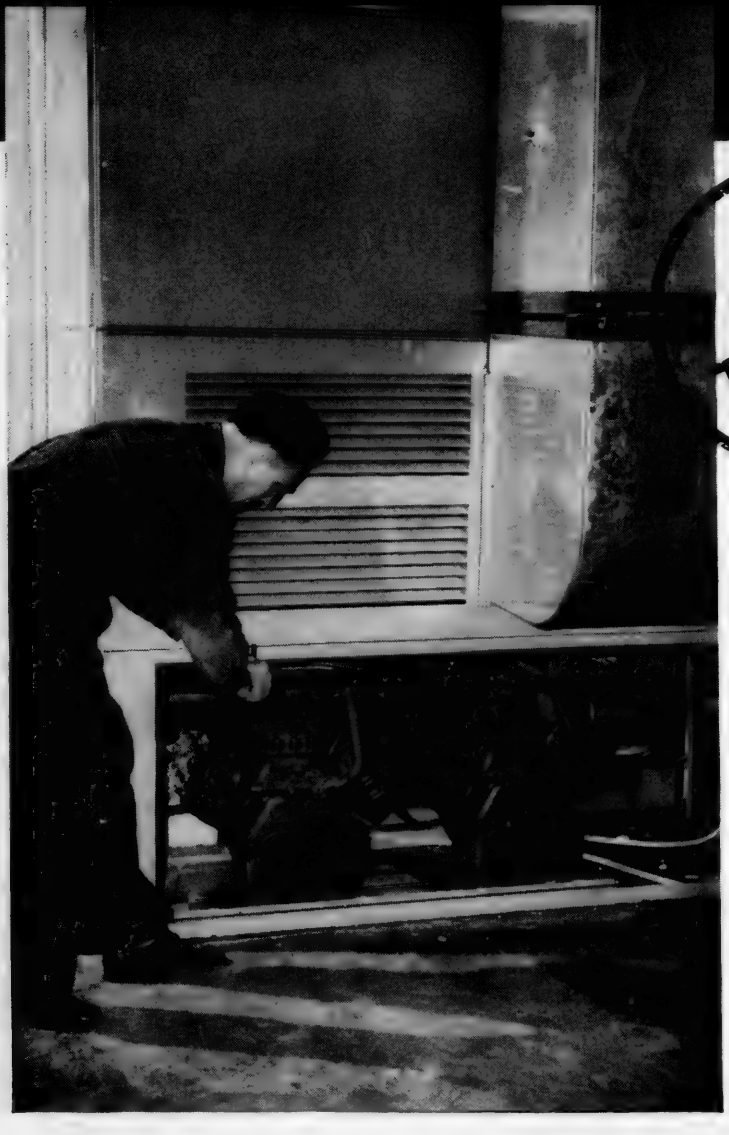
The "new" look in thermostats that's appearing on walls of commercial buildings throughout America. New design *inside* gives closer control, vastly superior performance.

MINNEAPOLIS **Honeywell**

First in Controls

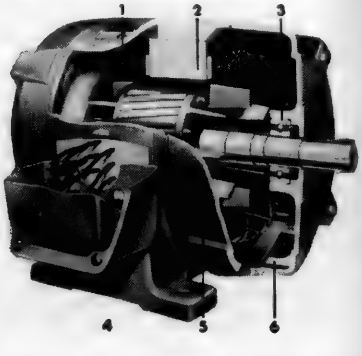
Only Honeywell gives you all four—
pneumatic, electric, electronic, instruments.





JOB TESTED

1. Fortified insulation lasts longer; resists moisture, oils and chemicals 2. Unitized stator gives better electrical performance 3. Pre-lubricated bearings eliminate on-the-job greasing 4. Precision manufacturing produces smooth, quiet operation 5. Armorized frame shrugs off physical abuse, stands up to attacks of foreign elements 6. Drip-proof ventilation gives complete protection *regardless* of mounting position.



Westinghouse Life-Line A motors customer approved for air conditioning

Westinghouse Life-Line® "A" motors have been thoroughly tested in tough air conditioning jobs throughout the country . . . and proved *outstanding* for rugged performance, dependability and extremely quiet operation.

Precision manufacturing and dynamic balancing of this Westinghouse motor have produced the quietest operating unit available. Tests in soundproof laboratories prove this Life-Line "A" motor produces an operating sound level lower than other standard motors.

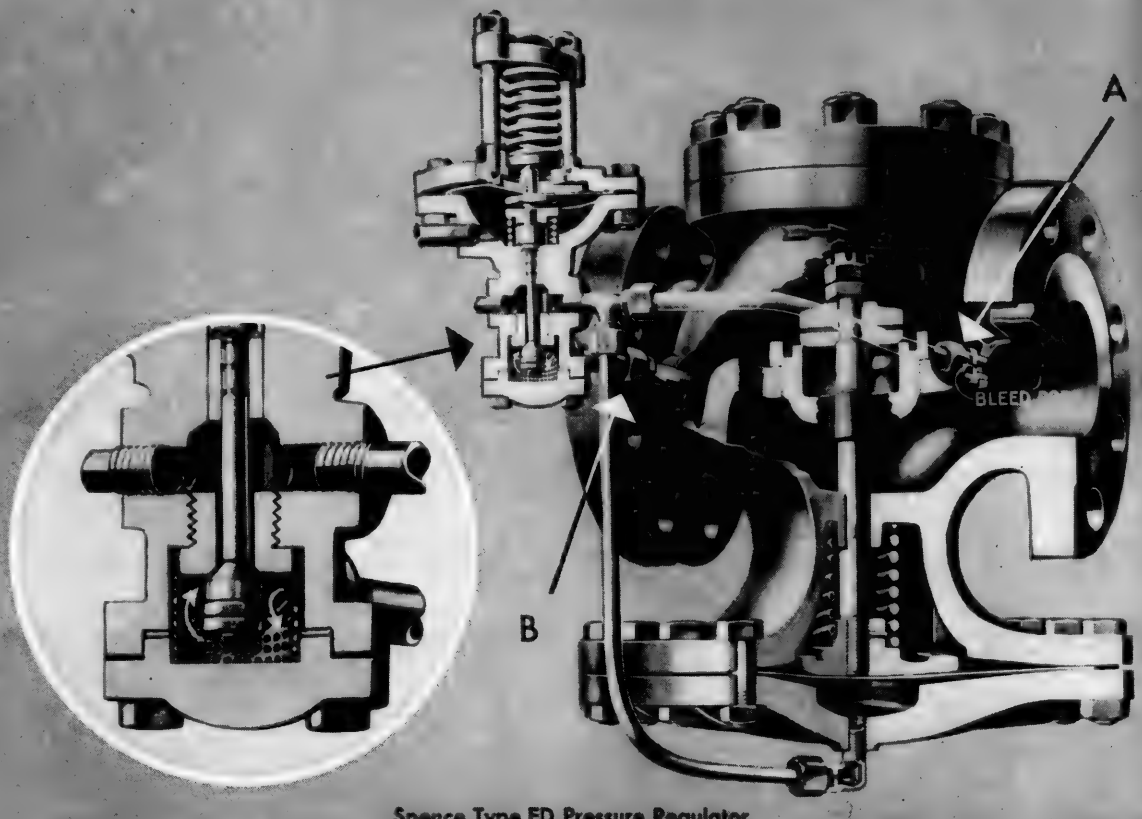
Armorized frame provides rigidity to prevent armature misalignment even with heavy shaft loads . . . protects motor from physical abuse and contamination. Ventilation openings in the end brackets make the Westinghouse motor *completely* drip-proof, regardless of mounting position. Life-Line "A" 4-way sealed, prelubricated bearings keep grease in . . . dirt and water out . . . eliminate on-the-job greasing in out-of-the-way applications.

For complete information, call your local Westinghouse distributor or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-22004

YOU CAN BE SURE...IF IT'S Westinghouse

VALVE TIPS:

Advantages of External Pilots in Automatic Regulating Valves



Spence Type ED Pressure Regulator

"Maintenance-free, trouble-free, install-and-forget." They're all pretty phrases, but every engineer knows from experience they don't apply to regulating valves. Any valve designed to control temperatures or pressures within tight limits can be affected by dirt or other foreign matter in steam lines.

One advantage of the external pilot mounting shown above is simplified maintenance. Trouble shooting is faster, downtime is reduced, and tempers don't take such a beating. Here's why:

If trouble develops, it's easy to find out if it's in the pilot or the main valve. Just remove the tubing bend at A. A simple test, without any instruments or other equipment, shows where the trouble is.

If the trouble is in the pilot, you can remove it by disconnecting the unions at B. There's no need to take the main valve out of the line.

The quickest way to get the regulator functioning again is to install a spare pilot. This is easy — and in the Spence design it's not expensive to carry spare pilots. Spence pilots fit all sizes of Spence main valves. There's no need to stock an expensive inventory of pilots for each main valve size.

In the enlarged sectional drawing above, you can see how the strainer, seat and disc of the pilot are readily accessible by removing the blind flange.

If the trouble is in the main valve, here again inspection is easy. If there's dirt in the steam line, it may clog the bleed port or restriction orifices. In the Spence design these can be inspected and cleaned by merely removing the tubing connections. The seat and disc of the main valve can also be inspected easily by removing the top flange.

These maintenance advantages, plus other advanced design features, are available for a wide range of regulating applications. For information on Spence's wide range of different automatic regulating valves, write for your copy of Bulletin 1005.

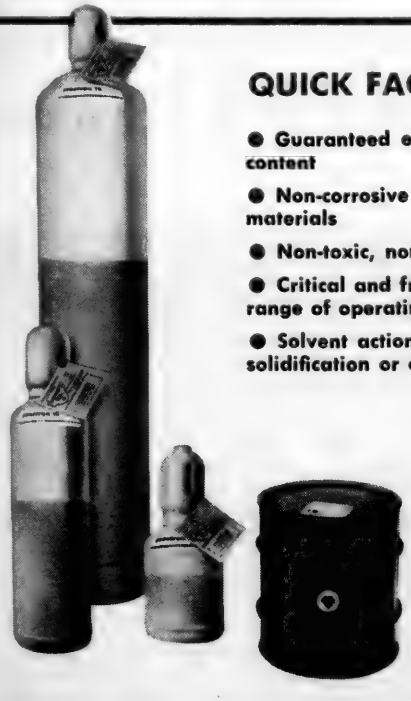
SPENCE ENGINEERING COMPANY, INC.
Walden, New York

See your wholesaler for

genetron® super-dry REFRIGERANTS

a complete line for your every need!

genetron 11—ORANGE LABEL TRICHLOROMONOFLUOROMETHANE	For industrial and commercial refrigeration and air conditioning systems using single or multi-stage centrifugal compressors. Can also be used for either direct or indirect expansion-type systems.
genetron 12—WHITE LABEL DICHLORODIFLUOROMETHANE **genetron 22**—GREEN LABEL MONOCHLORODIFLUOROMETHANE	Used in virtually all types of refrigeration and air conditioning equipment, large and small, household and industrial, direct and indirect expansion systems. Typical units in which "Genetron" 12 and 22 are used: refrigerators, freezers, frozen food lockers, window air conditioners, home or office console units, large custom-built units for commercial comfort or industrial processes, large store units, mobile units for transportation equipment, large home units for addition to present hot air heating systems.
genetron 113—PURPLE LABEL TRICHLOROTRIFLUOROETHANE	Used in 50-ton and larger centrifugal compressors, primarily for large comfort cooling systems, brine cooling systems, and other commercial and industrial air conditioning and refrigeration systems.
genetron 114$_A$—BLUE LABEL DICHLOROTETRAFLUOROETHANE	Used in centrifugal and rotary compressors for commercial, industrial and household refrigeration.



QUICK FACTS on genetron super-dry refrigerants

- Guaranteed exceptionally low moisture content
- Non-corrosive to standard equipment materials
- Non-toxic, non-flammable, stable, safe
- Critical and freezing points well outside range of operating uses
- Solvent action on oil helps prevent solidification or congealing of lubricant
- Freely interchangeable and may be mixed in any proportions with comparable fluorinated hydrocarbons meeting the same strict refrigerant specifications
- Aid in lubrication of equipment; generally miscible with oil
- Available everywhere, from refrigeration wholesalers throughout the country

Allied Chemical

genetron department

GENERAL CHEMICAL DIVISION

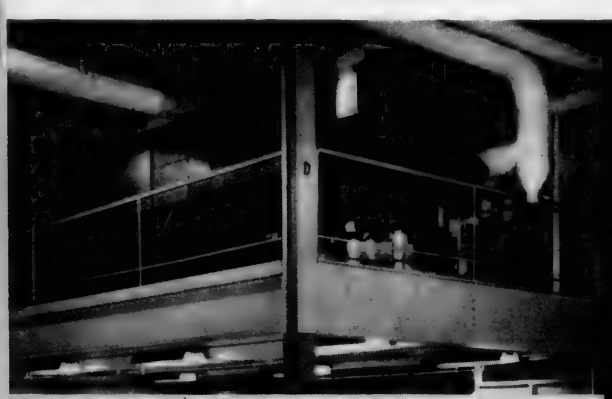
ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

HERE, FOUR HERMAN NELSON HEATING AND VENTILATING UNITS assure ample space heat in the large warehouse at the Newton, Iowa, plant . . . one of several such "cluster" arrangements. Suspended from the ceiling, the units hang out of the way, save valuable space, provide quiet operation. Herman Nelson units of this type are available in heat capacities to one million BTU's.

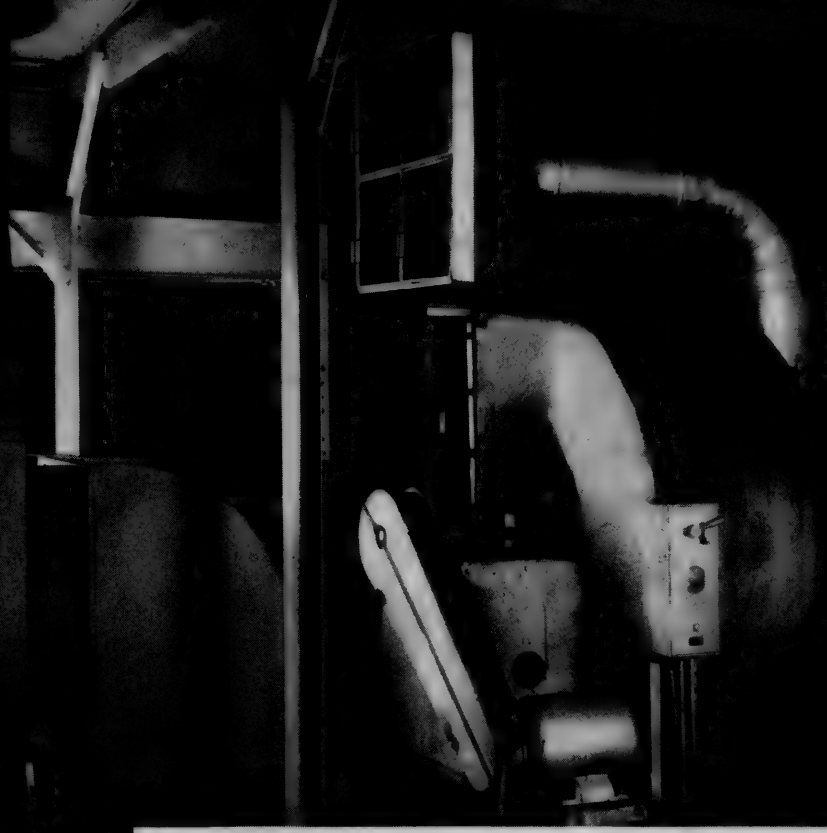
Easy-to-service **HERMAN NELSON** equipment solves many heating, exhausting and ventilating problems at **MAYTAG'S** Iowa plants

rchitects & Engineers—Brooks-Borg, Des Moines; Mech. Contractor—M. A. Wolin Plumbing & Heating, Des Moines; Gen. Contractor—Weitz Co., Des Moines. Fans engineered and installed by R. C. Mahon Co., Detroit.



TWO OTHER HERMAN NELSON HEATING AND VENTILATING UNITS provide abundant space heat for a service repair area. Here, units are located out of the way on a balcony. They can be installed on wall, ceiling or floor—with or without ducts. Fan sections are completely rotatable.

A BATTERY OF HERMAN NELSON VERTICAL UNIT HEATERS discharge warm air vertically downward or at an angle in various directions. Warehouse is heated comfortably, without drafts. Note location of the heaters high on the ceiling, out of the way. Insert shows Unit Heater detail.



A PAIR OF HERMAN NELSON CENTRIFUGAL FANS provide efficient exhausting at the Maytag plant. Unit at left serves for general exhausting. Unit at right removes super-heated air from a huge porcelaining oven. This air is so hot that asbestos covering was necessary on the fan—yet the machine has operated at top efficiency for the past nine years. Note four AAF permanent-type, washable filters at top of equipment.

Recently, Maytag's 10-millionth washer rolled off the production lines, as this independent home laundry appliance manufacturer set a production record unequaled in the industry. To reach this kind of record, Maytag plants must operate smoothly, efficiently. Dependable heating and ventilating is mighty important to help maintain these production schedules. Men *and* machines must operate efficiently, too.

Selection of Herman Nelson equipment for Maytag's automatic washer and dryer plant at Newton, Iowa, is another example of the confidence large manufacturers have in Herman Nelson. Years of trouble-free service are assured. If yours is a problem requiring better air, you can *depend upon* the quality, performance and efficiency of this *complete* line of air handling equipment. Tell us your needs. Our nation-wide sales and service organization is ready to help.

"Better Air Is Our Business!"

HERMAN NELSON CENTRIFUGAL FANS here handle other exhausting problems in the plant. These fans are available in either slow-speed or non-overloading types; 17 wheel diameters from 12¼" to 73"; 8 arrangements for direct or belt drive.

AAF herman nelson®

American Air Filter

Company, Inc.

215 Central Avenue • Louisville 8, Ky.

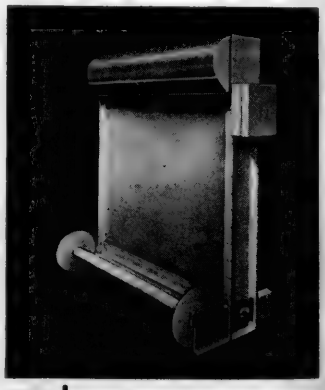
from broken glass— the world's most successful air filter

the one and only AAF *Roll*-O-MATIC

Today's "miracle" media in air filtration is Roll-o-mat, developed specially for the Roll-O-Matic air filter. This fluffy white blanket of bonded glass fibers features graduated density from front to back, yet compresses to paper-like thinness on the roll.

It's pre-charged with AAF viscosine, a product specially developed to retain its non-oily consistency under all temperature and humidity conditions. One roll of media lasts a full year in normal use, and changing media is as simple as changing the film in a camera!

If you want Roll-O-Matic performance—automatic operation, high air cleaning efficiency and practically no maintenance . . . all at a cost less than half that of throwaway filters—*specify* Roll-O-Matic. There's no other way to get it. Contact your local AAF representative or write for Bulletin No. 248A.



Herman Nelson Unit Blowers

Herman Nelson Propeller Fans

American Air Filter
COMPANY, INC.
294 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

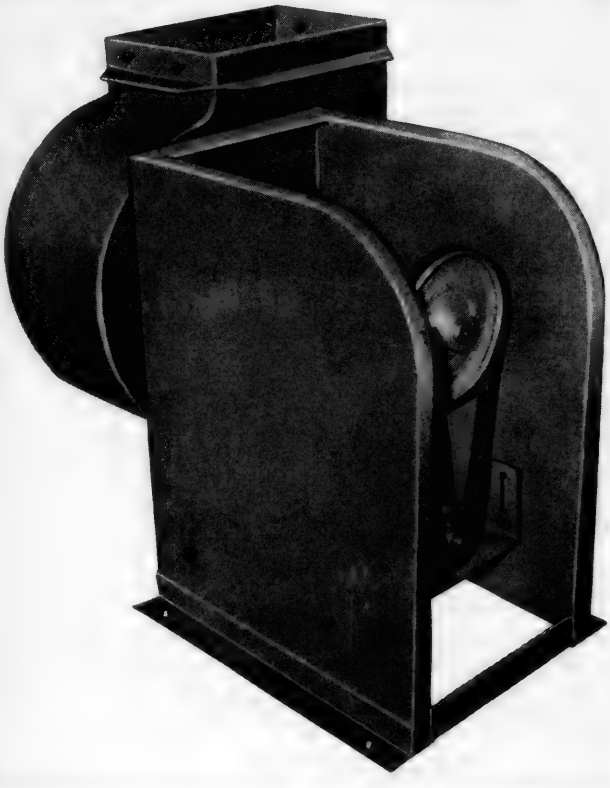
— BETTER AIR IS OUR BUSINESS —

Illinois Heating Specialties

Air Filters and Precipitators

"We enjoyed the biggest and best year at the IH and AC Exposition!"

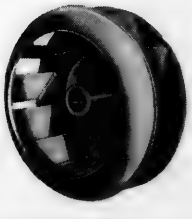
THANKS FOR STOPPING IN TO SEE OUR EXHIBIT



Our Utility Type Ventilating Fan won approval.

Catalog Bulletin No. 125 will be available soon.

Seven sizes are offered, from 13½" to 30" wheel diameter.



Backwardly curved blade wheel with non-overloading horse power characteristic.

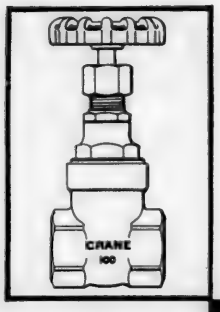
MASSACHUSETTS BLOWER DIVISION

The **BISHOP & BABCOCK** *Mfg. Co.*

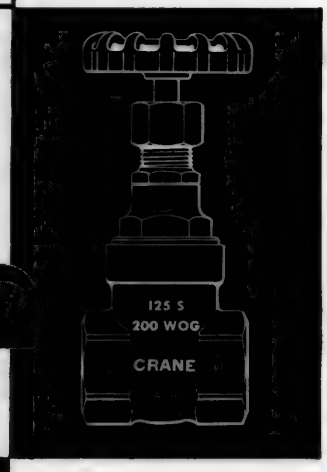
4901 HAMILTON AVENUE CLEVELAND 14, OHIO

The **MASSACHUSETTS** *Line*

Contractors' Preference for Hot Water Systems



No. 410—100-Pound
Sizes to 2 in.



No. 438—125-Pound
Sizes to 3 in.

No. 437—150-Pound
Sizes to 3 in.

CRANE
BRASS GATE
VALVES

100-, 125- and 150-Pound Classes
Non-Rising Stem—Wedge Disc

Here are today's preferred stop valves for hot water systems. They've earned top recognition for dependability, both under frequent operation and after extended idleness.

In each class they pack a lot of added quality at a competitive price.

For example, Crane cylindrical upper body design gives increased strength and rigidity. It's the same design principle as used for high-pressure steel valves. For a firm, safe wrench grip, Crane gives the hex ends wider than usual faces.

These valves have a deep, screwed-into-the-bonnet stuffing box. Its long contact with the stem gives the stem added support and maintains true alignment. This also reduces wear on packing.

Ask for Circular AD-1944

Get full information on these valves from your Crane Representative the next time he calls. Or write to address below for this circular giving all specification data.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

Chrysler Torque Flite Automatic Transmission Plant, Kokomo, Indiana. Architects and Engineers: Albert Kahn Associated Architects & Engineers, Inc., Detroit, Michigan; Mechanical Contractor: Freyn Bros., Inc., Indianapolis, Indiana.

Heating specialties by illinois in new Chrysler transmission plant!

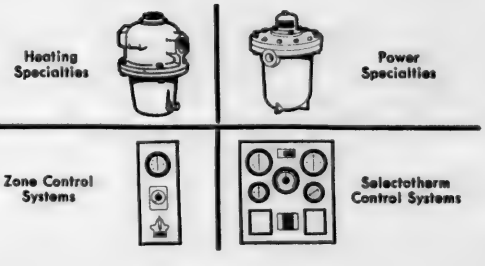
Nothing but the very finest job-tested equipment was installed in Chrysler Corporation's huge new Torque Flite automatic transmission plant at Kokomo, Indiana. This held true for the smallest steam trap as well as the largest heat treating furnace.

The photo at right shows a typical installation of Illinois Engineering products at the Chrysler plant. In this case, four float and thermostatic traps are trapping condensate from steam heating coils used in the supply air system.

24-hour delivery, 50-year durability—two *good* reasons for specifying Illinois traps. Select from a complete line of thermostatic traps, float and thermostatic traps and steam traps—25 inches vacuum to 600 lbs. pressure. Write for Bulletin 110.

illinois ENGINEERING

Illinois Engineering Company
2035 S. Racine Ave., Chicago 8, Ill.
A Division of American Air Filter Company, Inc.



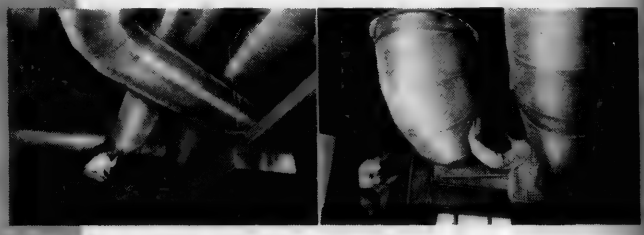
As in the New Orleans City Hall

New Orleans, La.

get longer-lasting ducts with Wheeling SOFTITE® COP-R-LOY® Galvanized Sheets

28 large central air conditioning units and 1,122 small air handling units were needed for the new $7½ million New Orleans City Hall. Mindful that the ducts should be as long-lasting and trouble-free as possible, Wheeling SOFTITE Cop-R-Loy Galvanized Sheets were used. These are the same type of copper-bearing sheets proved to *last up to 33 times longer!*

For full details, contact the Wheeling warehouse or sales office nearest you.



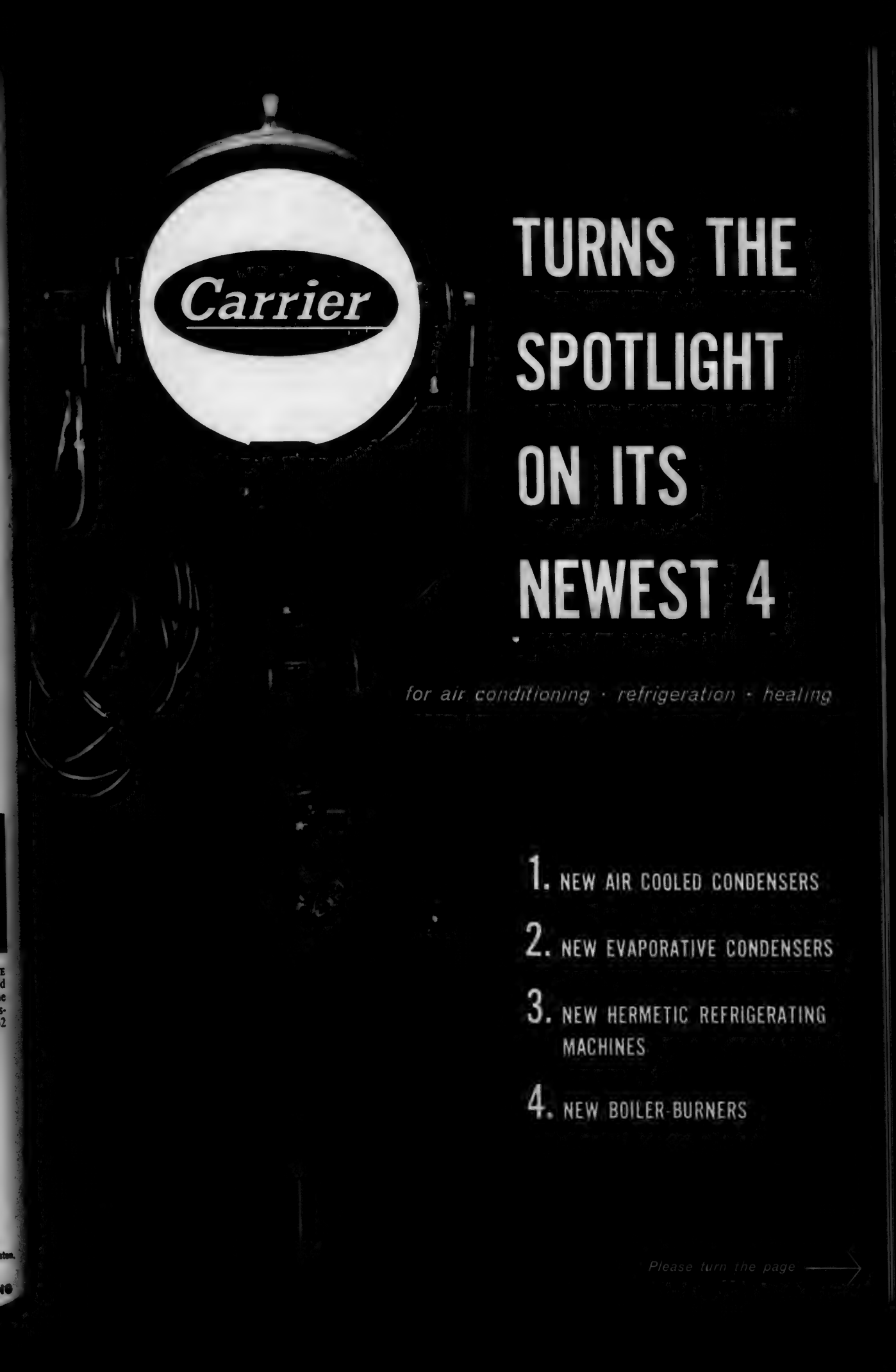
52 vertical ducts distribute 100,000 cfm of fresh air to 1,122 perimeter units—all Wheeling's new SOFTITE Cop-R-Loy Galvanized Sheets.

Wheeling SOFTITE Cop-R-Loy Galvanized Sheets were used for the 1,600 horizontal air distribution sections plus 62 vertical shafts.

Wheeling

WHEELING CORRUGATING COMPANY
WHEELING, W. VA.
IT'S WHEELING STEEL

Warehouses: Boston, Buffalo, Chicago, Columbus, Detroit, Kansas City, Louisville, Minneapolis, New Orleans, New York, Philadelphia, Richmond, St. Louis. Sales Offices: Atlanta, Houston.



TURNS THE SPOTLIGHT ON ITS NEWEST 4

for air conditioning · refrigeration · heating

1. NEW AIR COOLED CONDENSERS
2. NEW EVAPORATIVE CONDENSERS
3. NEW HERMETIC REFRIGERATING MACHINES
4. NEW BOILER-BURNERS

Please turn the page ⟶

TWO NEW WAYS TO SAVE WATER

1. NEW CARRIER AIR COOLED CONDENSERS

- Handle refrigeration loads from 2 to 38 tons, yet new casing design is more compact
- Low-silhouette casing ideal for installation on roof-tops or in areas with low headroom
- Condenses Refrigerants-12, -22 and Carrene-500

One of Carrier's new air cooled condensers can handle loads that would normally require several propeller-fan condensers. Special coil, with 14 aluminum fins per inch of tubing, and centrifugal fan combine to produce this high-capacity performance. Coil provides more heat transfer surface in less space. Fan draws air evenly across coil, utilizes its full capacity. Quiet centrifugal fan has ample power to move air through ductwork, makes this new Carrier condenser ideal for indoor installations. Can be floor or ceiling mounted. Provides vertical or horizontal air delivery indoors, horizontal only outdoors.

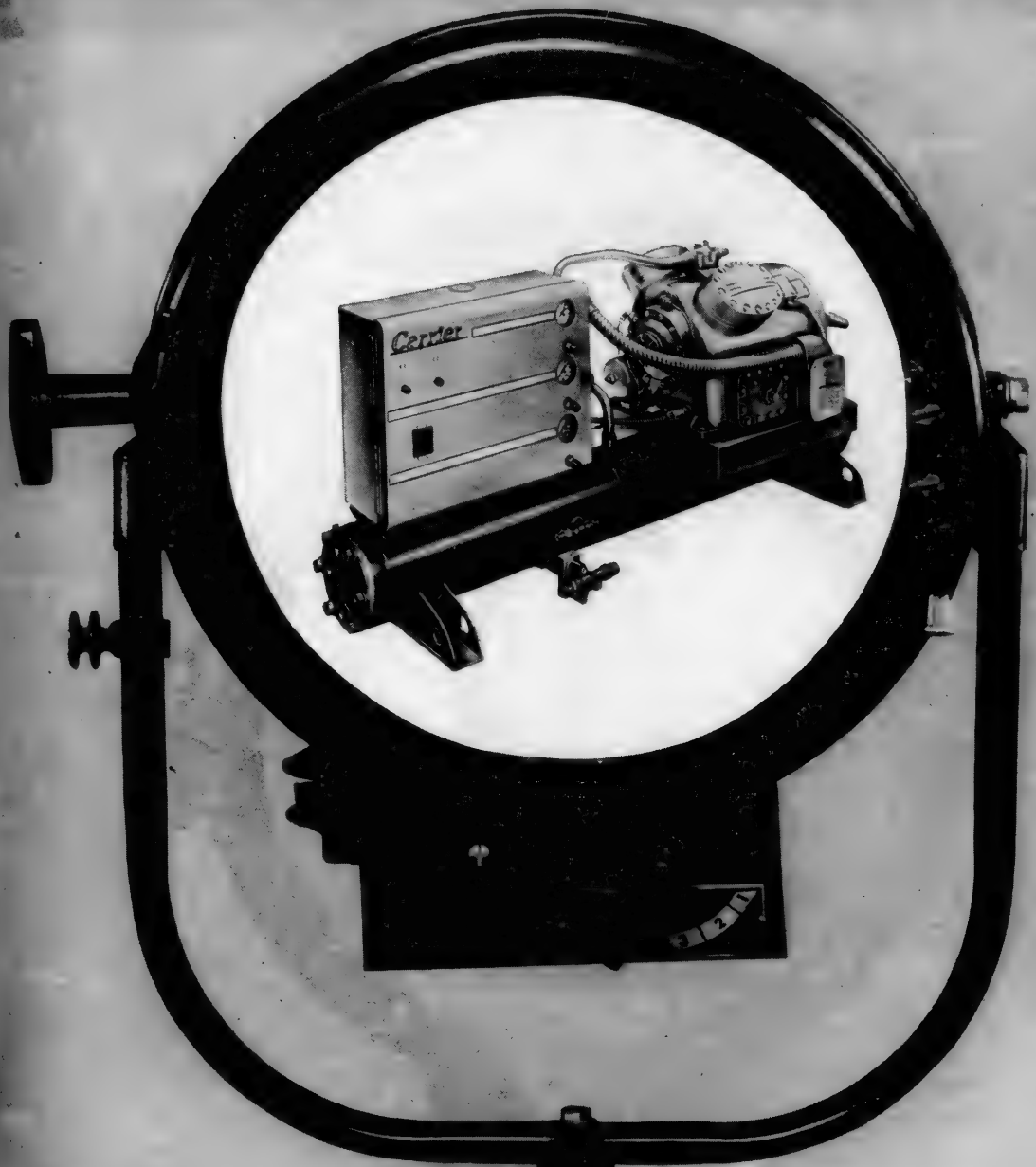
2. NEW CARRIER EVAPORATIVE CONDENSERS

- Exclusive new water distribution method requires no spray nozzles or eliminators
- New condensers weigh less, are lower in height, are easier to service
- Capacity range from 5 to 250 tons

Carrier's new evaporative condensers use a unique water distributing method in which water is pumped to a large pan at the top of the unit. Orifice holes in this pan meter water evenly into a perforated lower pan. This second pan breaks the water into droplets which drench the coil. This simple, effective system ends need for spray nozzles and eliminators, thus cuts maintenance problems. Powerful centrifugal fans draw air quietly across the coil, provide top refrigerating performance.

TURN TO Carrier FOR ADVANCE DESIGN

NEW FACTORY-ASSEMBLED HERMETIC REFRIGERATING MACHINES



3. NEW CARRIER HERMETIC CONDENSING UNITS

- **Hermetic compressor, condenser and controls completely factory-assembled for fast installation**
- **Master panel centralizes all safety and operating controls**
- **In 11 sizes from 10 to 60 hp**

Carrier's new hermetic condensing units for air conditioning and refrigeration arrive on the job ready to be installed. They save the time and expense involved in engineering, assembling and wiring a unit in the field. Carrier compressor and suction-gas-cooled motor form an integral unit. Problems of motor mounting, coupling alignment and shaft seal maintenance are eliminated. Yet the entire assembly can be serviced on the job if necessary. Complete control panel contains all safety and operating controls plus a terminal panel which simplifies wiring to other components.

TURN TO Carrier FOR SUPERIOR PRODUCTS

NEW STEAM OR HOT WATER BOILERS

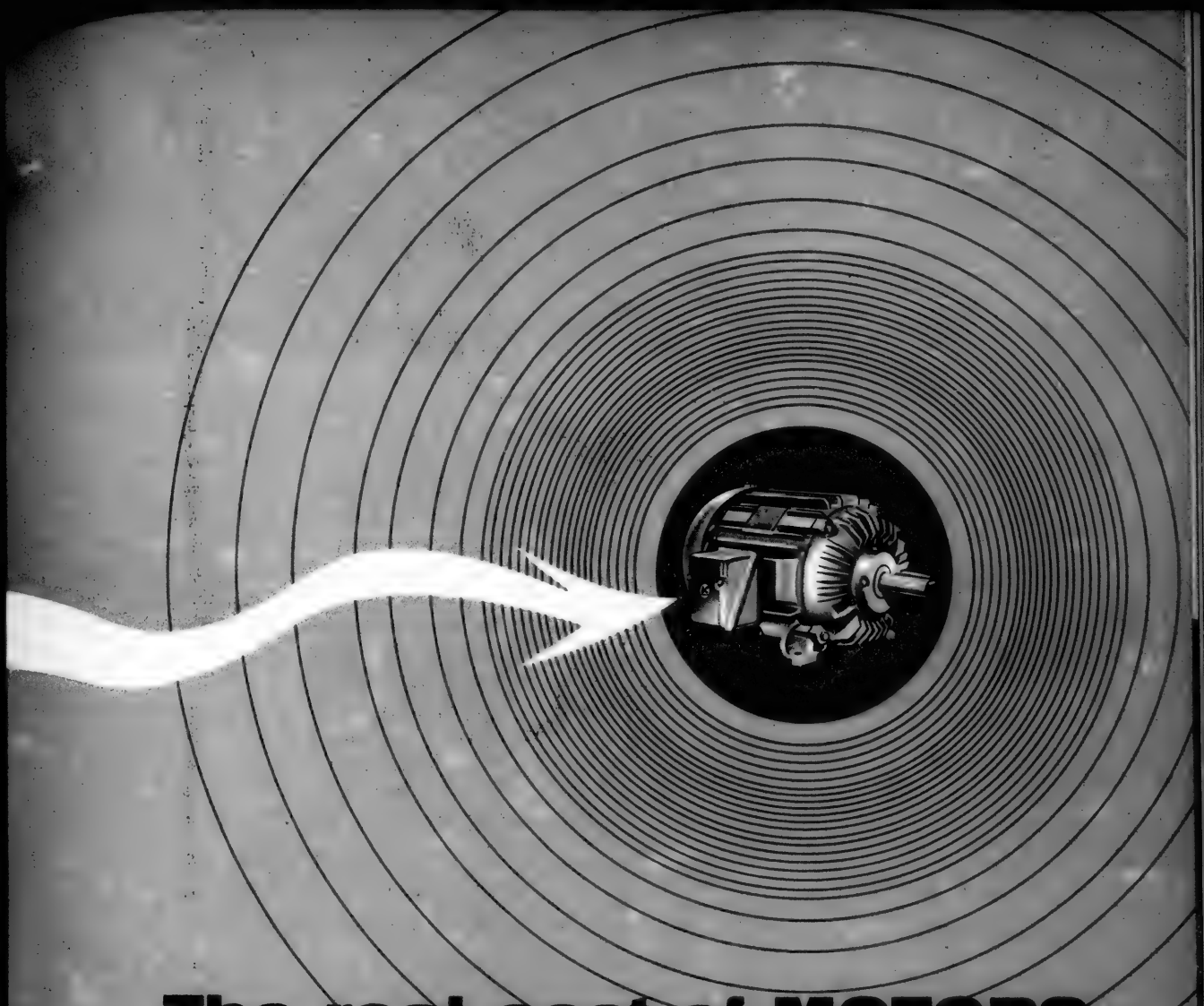
4. NEW CARRIER BOILER-BURNERS

- **Take up 48% less floor space than horizontal steel or cast-iron boilers of equal rating**
- **Tested 300% above normal safety requirements of A.S.M.E.—each unit stamped with their symbol**
- **Gas or oil fired in 11 sizes ranging in net capacities from 81,000 BTU to 810,000 BTU per hour**

Now Carrier expands its line-up with new steam or hot water boilers engineered for a long life of safe, economical use in residences and small commercial buildings. They're compact and simple to clean. And their entire design more than meets the rigid requirements of the low-pressure boiler construction code of the A.S.M.E. Each unit is hydrostatically tested at 200 psi, or 300% above normal A.S.M.E. requirements. Each unit is stamped with their symbol. The use of 5/16-inch steel in critical areas is another bonus feature built into new Carrier boilers.

FOR MORE INFORMATION, CALL YOUR Carrier DEALER, LISTED IN THE CLASSIFIED DIRECTORY, OR WRITE

CARRIER CORPORATION, SYRACUSE, NEW YORK



The real cost of MOTORS

The cost of a motor extends over its entire lifetime. It does not end with purchase price. Cost *goes up* with every shutdown, every motor maintenance stoppage. Cost *stays down* when you buy quality. And quality means Allis-Chalmers.

All of these extras that don't show on the Allis-Chalmers nameplate — more copper, more iron, more cooling provisions—exemplify the quality-craftsmanship that goes in before the price tag goes on.

For the "long run," either as a new machinery component or as replacement, specify Allis-Chalmers. Find out more about *real* quality in motors from your A-C district office or distributor, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

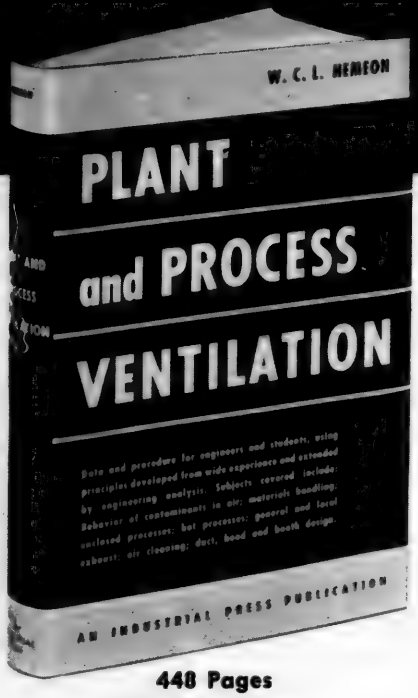
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5287

VALUABLE BOOKS

To Help You Solve Plant Ventilation Problems

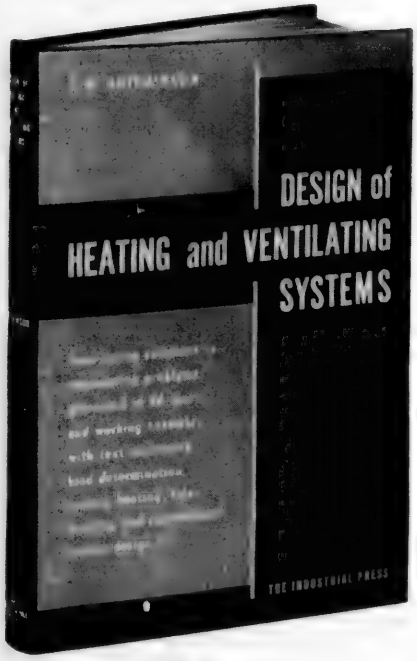


448 Pages
172 Illustrations

$9.00

In Canada or overseas, $10.00

PLANT AND PROCESS VENTILATION, by W. C. L. Hemeon, presents for the first time a comprehensive treatment of fundamental principles and their practical application in the design of ventilating systems for control of industrial air contaminants. Physical laws are translated into clear and logical procedures for calculating required air volumes and velocities for exhaust, ventilation, and material transport. New meaning is given to velocity contours around suction openings. The author's original concepts of dilution ventilation and hot process ventilation are fully presented. The reader is greatly assisted by carefully selected and completely worked out illustrative problems. Theodore Hatch in his review says: "This volume, to an outstanding degree, raised the level of analysis and design from an empirical stage to one based upon sound physical and engineering principles. The book is written for practical design engineers. Use of the design principles . . . will result in better performance . . . fewer system failures, and lowered operating costs." Send for your copy of this valuable book today.



320 Pages
96 Charts

$7.00

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Engineers, Contractors, Students Will Find Each Book a Useful Reference and Working Manual

You can solve problems involving load determination, duct design, panel heating, solar heating and combustion analysis directly by means of the 96 full-page working graphs which are an outstanding feature of DESIGN OF HEATING AND VENTILATING SYSTEMS. In many cases the use of these graphs will entirely eliminate calculation, while in others the graphs serve to minimize the arithmetical work needed in solving the equations. The scales used in constructing the graphs have been selected so that the accuracy to which each graph can be read will equal or exceed the limitis of accuracy of the equation from which it was derived. Opposite each graph is a design example and the solution illustrating the use of the method. Explanatory text in each chapter clearly explains the engineering background and the mathematical basis of each graphical solution. Basic handbook data are also included so that, with the simple insertion of field data, design situations can be analyzed. If you are concerned with problems in the design of heating and ventilating systems, send for this book and you will save hours of time and insure accurate calculations for many complex problems.

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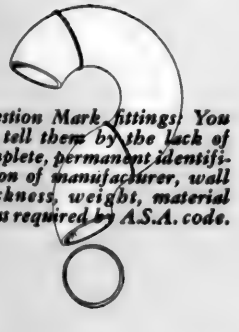
93 Worth Street **New York 13, N. Y.**

Why try to cut corners with *Question-Mark** fittings?



**Question Mark fittings: You can tell them by the lack of complete, permanent identification of manufacturer, wall thickness, weight, material ... as required by A.S.A. code.*

Unknown welding fittings are as risky as unmarked turns on a busy highway. These blind spots in an expensive piping project cause slow-downs, confusion, trouble . . . waste time and money.

"Question Mark" fittings may look like a bargain on the price tag, but watch out for the after-costs . . . poor fit-up, impaired quality, questionable supply, lack of engineering service! Your reputation is at stake!

A message in the interests of top quality piping . . .
by Tube Turns, Louisville, Kentucky.

He knows he's getting the exact fitting specified on the blueprint because each TUBE-TURN product is clearly marked with all designations.

Save manhours...avoid piping risks with known fittings

You save purchasing time, get prompt delivery, speed up installation, and help assure reliable piping performance when you specify TUBE-TURN* Welding Fittings and Flanges. They meet all American Standard and Safety Code requirements. Each product is permanently marked with complete size and material designation. Your nearby Tube Turns' distributor gives you prompt delivery from the complete-line stock, and makes available Tube Turns' unmatched engineering service.

You *know* your piping investment is safeguarded when you specify and buy Tube Turns' products.

Your nearby Tube Turns' Distributor meets your needs promptly from the complete line of more than 12,000 Tube Turns' stocked items.

The Leading Manufacturer of Welding Fittings and Flanges

TUBE TURNS

LOUISVILLE 1, KENTUCKY

A Division of National Cylinder Gas Company

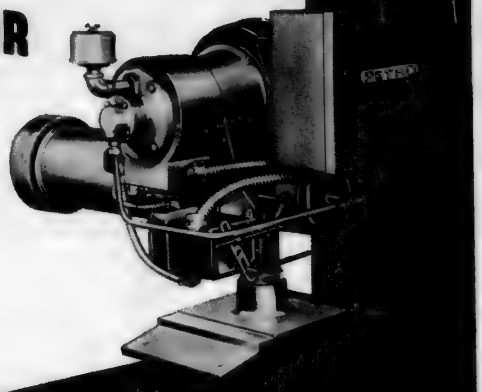
DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Chicago • Detroit • Atlanta • New Orleans • Houston • Midland • Dallas • Tulsa • Kansas City • Denver • Los Angeles • San Francisco • Seattle

In Canada: Tube Turns of Canada, Ltd., Ridgetown, Ontario • Toronto, Ontario • Edmonton, Alberta

*"TUBE-TURN" and "tt" Reg. U. S. Pat. Off.

NEW PETRO BURNER FIRES LIGHT OR HEAVY OILS...

Including ALL grades of No. 5



3 TO 25 GALLONS PER HOUR

New principle produces finest atomization yet achieved in an oil burner.

★

Electric ignition

★

Oil heating required only for pumping or starting with heavy oil.

★

Built-in control panel

★

Low fire starts - Full modulation

Fires low-cost oils with traditional PETRO dependability

The revolutionary atomizing principle used in the new Petro Supercharger Burner produces the highest degree of atomization ever achieved in a burner for heavy oils. Oil and air are premixed in a supercharger, where the self-generating heat resulting from compression of the air-oil mixture, atomizes even heavy No. 5 oils into a highly volatile mist. This revolutionary Petro burner mechanically atomizes the oil, but, *in addition*, the supercharger further reduces the oil spray to a microscopic air-oil vapor.

Heating of oil is needed only for starting or pumping when the heavier oils are used. Therefore, the power load is hardly more than that required to operate the motor.

Controls are available to operate this Petro burner either with continuous fire, high-low or with full modulation.

These new Petro burners are available for two important uses: either for conversion, or as a component part of a packaged boiler-burner unit. It fires low cost heavy residual oils with little more attention than a domestic oil burner.

For more information and specifications, please mail the coupon.

PETRO.

3522 West 106th Street, Cleveland 11, Ohio
(In Canada: 2231 Bloor St. W., Toronto, Ont.)

Please send me more information on the money-saving new Petro Supercharger Burner.

Name_____

Company_____

Address_____

City_____ State_____

BRAND NEW!

FAR-AIR®

ROLL-KLEEN

automatic DRY FILTER

Here is a new, modern filter that combines fully automatic operation and high efficiency with large dirt holding capacity and minimum maintenance. Engineered for simplicity of operation, the Roll-Kleen offers dependable performance at low operating cost.

HOW IT WORKS

Glass fiber media with an open mesh cloth backing bonded to the downstream side, passes from the top supply roll, over the filtering area support grid, and onto the takeup roll. A preset rise in filter resistance, indicating dirty media, triggers the takeup roll drive to draw clean media completely over the support grid. This complete change-out assures maximum efficiency at all times.

PERFORMANCE

The Roll-Kleen is designed to operate at 350 to 520 fpm face velocity. Efficiency on Standardized Fine Air Cleaner Test Dust is 85% at 520 fpm and 80+% at 350 fpm.

MAINTENANCE

Other than occasional visual inspections, the Roll-Kleen is virtually maintenance-free. Warning lights (which may be located anywhere in your plant) tell when the media is dirt-loaded as well as when the media roll needs replacing.

CONSTRUCTION

Made of the finest quality components, the Roll-Kleen is available in standard widths of 3, 4 and 5 ft. and heights from 5 ft. to 15 ft. Units may be joined together to meet any CFM requirement.

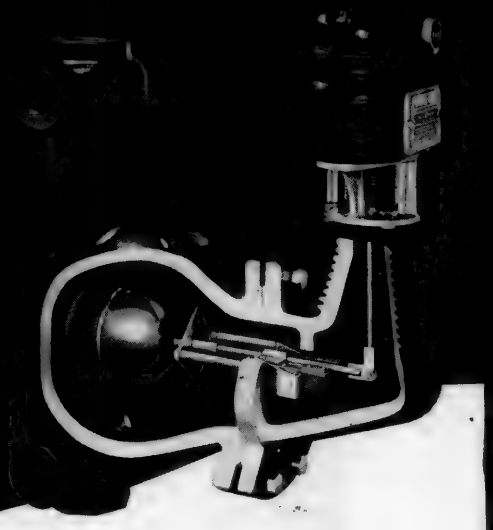
Write for complete catalog information.

FARR COMPANY

LOS ANGELES • NEW YORK • CHICAGO • NEW ORLEANS

Manufacturing Licensees:
Farr Company Mfg. Ltd.
Montreal, Canada
The Clyde Engineering Co. Pty. Ltd.
Sydney, Australia
Intermit Ltd.
Birmingham, England

Originators of **FAR-AIR** *Certified Filter Service*



KNOW THIS 92 SERIES

In Four Models that meet all conditions

Here is the real answer to water level control for boilers up to 250 psi—the McDonnell 92 series providing pump control, low water fuel cut-off, and low water alarm.

This control has exactly what it takes for high pressure and temperature. Notice, for example, the generous float chamber with wide clearances between float and walls.

Keeping heat away from the switch mechanism is a foremost requirement in a control of this kind. In the 92 series an ingenious heat barrier, tapered neck, and fins, combine to effect an unprecedented heat dissipation—well proved by the fact that the 92 series complies with *current* underwriters' specification for 75°C wiring at switch terminals.

The 92 series combines a more effective use of magnetic switch actuation with McDonnell-built open contact switches—switches that do not call for the accurate alignment of the control that is necessary with other types.

There are too many features of the 92 series to cover here, but the whole story can be told in three words: *McDonnell quality throughout!* Note how the 92 series is built for you in four forms to fit right in to any boiler job requirement.

State your conditions. Let us help you select the right 92 series control for your job. Ask for complete engineering folder on 92 series installations, and wiring sheets.

McDONNELL & MILLER, Inc.
3500 N. Spaulding Ave., Chicago 18, Ill.

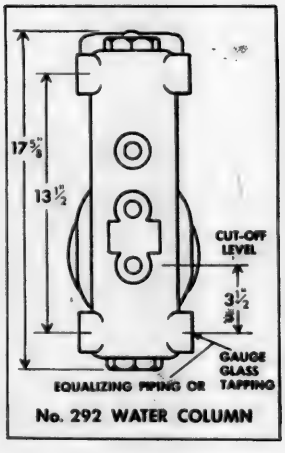
Doing One Thing Well

What the 92 series does—The 92 series does three basic jobs, singly or in combination: (1) controls boiler feed pump *from* the boiler—exactly as it should be controlled for maximum efficiency (2) provides a low water fuel cut-off—cuts current to burner in the event of a low water emergency (3) closes circuit for operating low water alarm whenever low water occurs. Series 92 controls are also adaptable to a wide range of industrial liquid level control applications involving pressures up to 250 psi. Upper switch includes extra circuit to gain 3 wire operator for motor operated valves.

1 The Adaptable Water Column Form

There are two 92 series controls with self-contained, water-column bodies having tappings for water-glass and tri-cocks. Water-column form simplifies installation, provides correct equalization, cuts costs and assures a trim, workmanlike job. Tappings provide for mounting control on either side of the boiler with gauge glass mounted on either side of control. The two 92 series water-column types are:

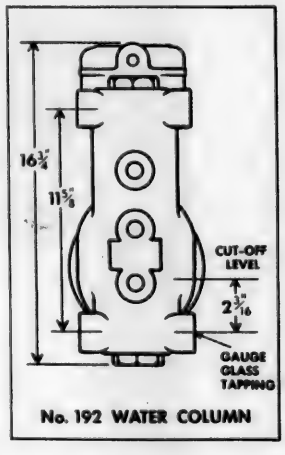
No. 292 Principle dimensions shown in drawing. Note cut-off level is 3½" above center of lower gauge glass tapping. This taller body with higher cut-off point assures water level being plainly visible when located high on a big boiler. Control may be installed with either top and bottom or side equalizing connections. Gauge glass tappings may be reduced to either ¾" or ½"; tri-cock tappings, ½"; equalizing tappings, 1¼" top and bottom, or 1" side.



No. 292 WATER COLUMN

2

No. 192 Dimensions opposite. Body is shorter, cut-off level lower than in 292, ideal for most fire-tube boilers. Both gauge glass and tri-cock tappings are ½"; equalizing tappings, 1¼".



No. 192 WATER COLUMN

Without Water Column

These two controls have the same basic operating mechanism as 192 and 292, but are designed for installation with independent water column.

3

No. 92 Has 1¼" top and bottom equalizing tappings.

4

No. 92A Has two additional 1¼" side tappings for use where equalizing piping takes this form.

No. 92

No. 92A

McDONNELL

AIRCOUSTAT* sound trap layout for controllin

AIRCOUSTAT SILENCES ALL FREQUENCIES IN THE AUDIO-FREQUENCY RANGE

Resonators hold low-frequency sounds
Periodic internal structure dampens middle-frequency noise
Sound-absorbent materials suppress high frequencies

Simplify design and air conditioning noise

THIS 5-FT. AIRCOUSTAT REPLACES 80 FEET OF ORDINARY DUCT LINING

AIRCOUSTAT saves you time on the job because it's pre-engineered . . . and fits acoustically if it fits geometrically. AIRCOUSTAT is quick and easy to install . . . no special tools are required.

Most Efficient Solution

AIRCOUSTAT's power to deaden sound is unmatched by other sound control methods devised for air conditioning systems. Acoustical performance is *guaranteed*. Efficiency is more than 13 times that of ordinary lining. And AIRCOUSTAT provides a lower flow resistance and less pressure drop than other sound control methods.

AIRCOUSTAT suppresses sound in low-velocity air conditioning systems . . . will silence an entire system or selected outlets. AIRCOUSTAT units fit any size of duct within the range of unit sizes . . . adapt themselves to any shape of duct.

Cost You 50% Less

AIRCOUSTAT units cost you as much as 50% less than ordinary duct lining . . . with savings in time and labor costs. AIRCOUSTAT is quick and easy to install . . . no special tools are required. You can ship ducts nested together and store them outside on the job site.

Apply Anywhere

AIRCOUSTAT eliminates noise in a wide range of applications: general and private offices, conference rooms, sleeping quarters, and recording studios.

Born of the Jet Age

Koppers' amazing new AIRCOUSTAT is the product of years of experience in designing sound control installations for aviation and other industries. Jet engine housings, machine enclosures, sound barriers and traps, sound-proof foremen's offices—these are only a few of the many sound control devices created by Koppers Industrial Sound Control engineers. Koppers has put this engineering "know-how" to work silencing air conditioning noises more effectively . . . more economically than was ever before possible . . . saving you time and costs.

For more details, write to KOPPERS COMPANY, INC., Industrial Sound Control Dept., 6304 Scott Street, Baltimore 3, Maryland.

*Koppers Trademark

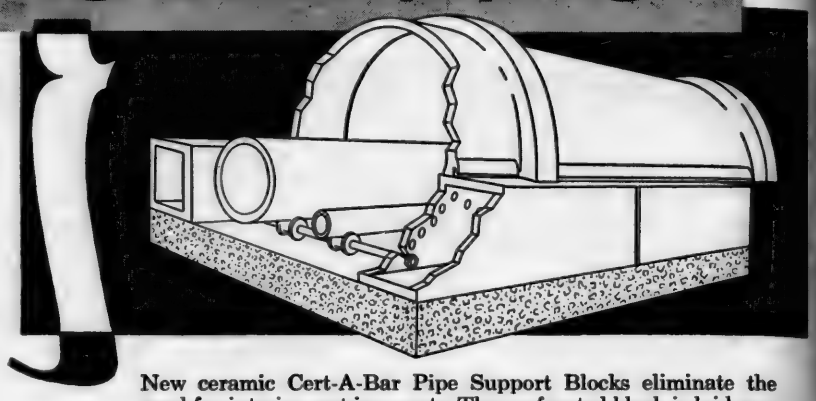
KOPPERS

INDUSTRIAL SOUND CONTROL

Engineered Products Sold with *Service*

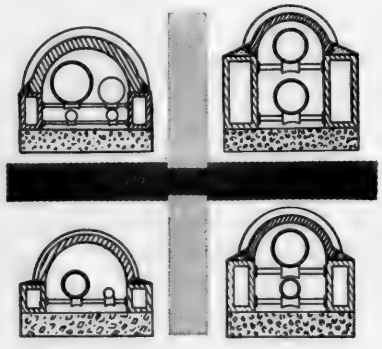
PERMANENT PROTECTION
for underground piping!

STILLWATER CERT-A-BAR* TUNNEL CONDUIT SYSTEM



New ceramic Cert-A-Bar Pipe Support Blocks eliminate the need for interior cast iron rests. The perforated block is laid as a structural support member at regular intervals, and the bars are simply inserted and locked in place.

THE vital consideration in selecting an underground conduit system is *permanent* protection . . . not for one year or five, *but for the life of the piping.* You get the best possible protection for your underground metal service piping with a Stillwater Conduit System of vitrified clay. It's chemically inert—can't rust, rot, corrode, or decay . . . ever. And it is manufactured in accordance with ASTM specification C-13-54, assuring proper strength and quality. Any combination of service piping can be protected. Conduit is available in a wide range of sizes, with a complete line of fittings and accessories, including alignment guides, lateral guides, and anchors. Any contractor's crew can handle the installation easily, or if you prefer, Stillwater Licensed Installers will assume the responsibility. The Cert-A-Bar Tunnel System can be installed with any of three suggested new waterproofing specifications —one for average conditions, one for intermittent ground water conditions, and a third for high water table conditions. It's the lowest-cost conduit per year of service that you can specify or install!



THE CERT-A-BAR SYSTEM HAS ALL THESE IMPORTANT ADVANTAGES

- Inherent structural strength for permanent protection
- Complete flexibility for design
- Minimum initial and long-term costs
- Quickly installed
- Keeps pipe insulation dry
- No electrolytic corrosion of piping
- No maintenance required

A few of the hundreds of possible combinations of piping for the Cert-A-Bar Tunnel System are shown at left.

WRITE FOR

illustrated, four-page circular with complete installation specifications.

*T.M. Reg. App. For.
Patents Pending

The Stillwater Clay Products Co.
STILLWATER CONDUIT DIVISION
3334D PROSPECT AVENUE, CLEVELAND 15, OHIO

STILLWATER CONDUIT SYSTEMS

Brunner offers the right H.P.

HORSEPOWER

for every Refrigeration and Air Conditioning Job

H.P.

The Brunner line of Refrigeration and Air Conditioning Condensing Units offers a wide horsepower range... the right size for every job from ¼ H.P. through 100 H.P.

Build more sales with the complete Brunner line, backed by a nation-wide net-work of over 180 Brunner Supply Depots.

BRUNNER MANUFACTURING COMPANY, UTICA, N.Y.
The Brunner Co., Gainesville, Ga.
In Canada: Brunner Corp. (Canada) Ltd., Toronto, Ont.

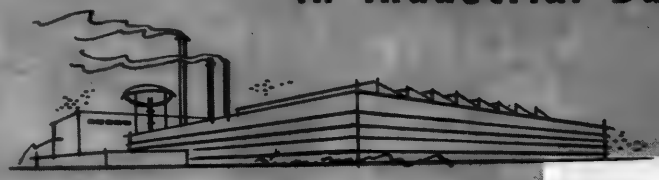
BRUNNER
SINCE 1906

BRUNNER-METIC semi-hermetic Refrigeration Condensing Units from ¼ H.P. through 3 H.P.

OPEN-TYPE Condensing Units available from ¼ H.P. through 100 H.P.

RUNNERIZE FOR DEPENDABLE REFRIGERATION AND AIR CONDITIONING

For Permanent FIRE PROTECTION in Industrial Buildings...



These ALLENCO Fieldmen helped on these recent installations

Where	What	Specifier	Installer	Allenco Fieldman
Los Angeles, Cal.	Ramo-Wooldridge Corp.	Albert C. Martin & Assoc.	Rockwood Sprinkler Co.	Lang Pratt
Glendale, Ariz.	Salt River Power Co.	Bechtel Corp.	Bechtel Corp.	Lang Pratt
Boron, Calif.	Pacific Coast Borax Company	Southwestern Engr. Company	Forgeron Plumbing Company	Lang Pratt
Wilmington, Cal.	Vegetable Oil Products	Engineering Dept.	Rigoli Company	Lang Pratt
Anaheim, Cal.	Moore Business Forms	Albert C. Martin & Assoc.	Curtis Automatic Sprinkler Co.	Lang Pratt
Los Angeles, Cal.	Pepsi-Cola Bottling Company	Albert C. Martin & Assoc.	California Viking Sprinkler Co.	Lang Pratt
Campbells, Ind.	Indianapolis Power & Light Company—Generating Plant	Themselves	Themselves	Don Davisson
Tulsa, Okla.	Jones & Laughlin Steel Corp.	H. Lyman Cauvel	W. F. Glenn Plumbing Company	Floyd Merryman
Bartlesville, Okla.	Phillips "66" Proving Station Project	Phillips Engr. Dept.	Carl Moore Co.	Floyd Merryman
Riverdale, Ill.	Acme Steel Company	Schmidt, Garden & Erikson	La Salle Construction Company	M. Jepsen
Indianapolis, Ind.	General Motors Corp. —Allison Division	Argonaut Realty Div., Gen. Motors Corp.	Daniel J. Keating Company	George Fee
Athens, Texas	Olive Myers Plant	Giffels & Vallet, Inc., Arch.—C. Cleasman, Engineer	Wm. H. LaDew	Hugh Cunningham
Dallas, Texas	Goodyear Rubber Plant	Harold A. Berry, Arch. and Engr.	Wm. H. LaDew	Hugh Cunningham
Ransonville, Mich.	Ford Motor Company	Giffels & Vallet, Inc. L. Rossetti	John E. Green P & H Company	Russ Collins
Middletown, Conn.	Canal Project, United Aircraft Corp. Atomic Eng. Plant	Chas. T. Main, Inc.	Fred Raff, Inc.	Harold Jope
Wethersfield, Conn.	State of Connecticut, Highway Office Bldg. & Garage	Hubbard, Lawless & Blakeley	Buckingham-Routh	Harold Jope

Lang Pratt

Don Davisson

F. Merryman

M. Jepsen

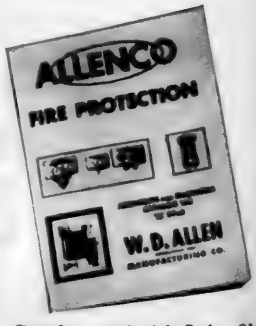
Geo. Fee

H. Cunningham

Russ Collins

Harold Jope

For prompt, qualified, personal help on any interior fire protection questions, call in your ALLENCO fieldman. Check your classified phone directory or write or phone our Home Office.



Catalog 150 (A.I.A. file 29e2) contains full details in simplest form, including standard "copyable" specifications. Write for your copy now.

Architects, Engineers and Contractors prefer ALLENCO

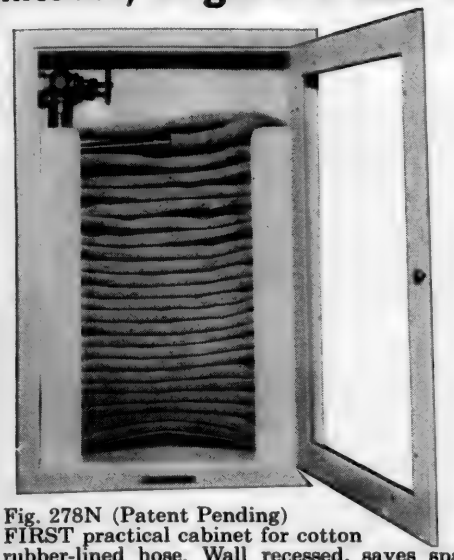


Fig. 278N (Patent Pending)
FIRST practical cabinet for cotton rubber-lined hose. Wall recessed, saves space; fully enclosed, resists attack by fumes, dust, etc. Cradles hose in soft folds, ready for instant use. Several models, sizes and hose-lengths.

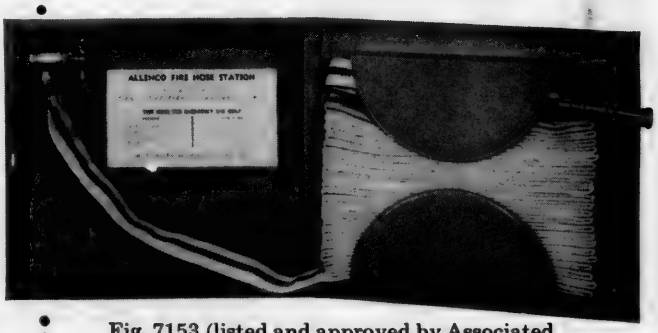


Fig. 7153 (listed and approved by Associated Factory Mutual Insurance Companies)—UNIQUE form of major fire hose cabinet, ideal for smaller structures. Steel cabinet no bigger than phonograph record album holds 30-40-50-75 feet of fire type hose. Recessed or wall hung.

Of the many distinct ALLENCO *products and models, these are most widely specified and installed in the industrial field*

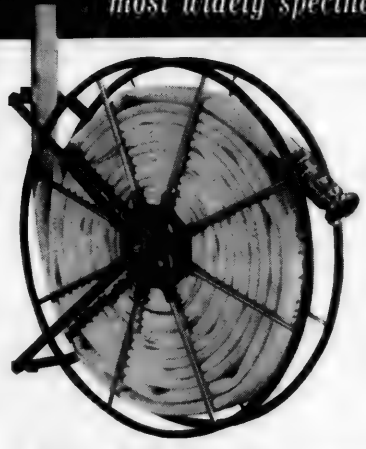
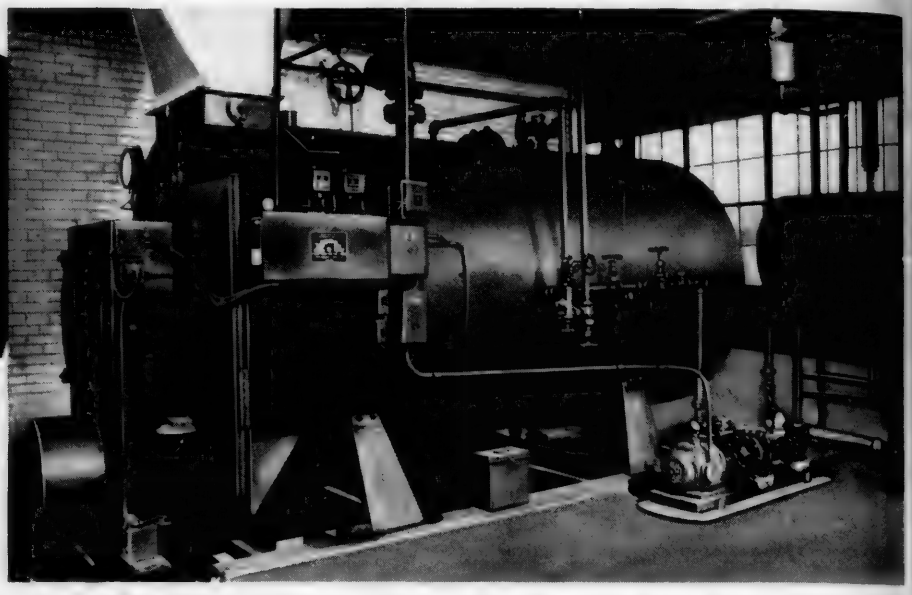


Fig. 145 (UL and FM listed and approved)—Ryerson swinging hose reel with wall brackets or pipe clamps. Holds 50-100-150 feet of cotton rubber-lined hose out of way, yet swings and feeds instantly. To suit type, size and length of hose required.

Fig. 7170 (Patent Pending)—"Hozegard" reel combines protection with fastest way to get full pressure at nozzle in use. Best for linen or light-weight CRL hose, 50-75-100 feet in length, up to 1½" size. Adds years to hose life, fights fire faster.

ALLENCO W. D. ALLEN MANUFACTURING CO.
Rm. 700 Allenco Bldg. 566 W. Lake St. Chicago 6

"As an engineer, I know the advantages of SIMPLIFIED OPERATION in Packaged Boilers"



New 150-HP gas-fired Continental Automatic Boiler, installed in Progress Laundry, Dallas, Texas, reducing gas consumption more than one-third. Continental Boiler Distributor: J. P. Philibert, Fort Worth, Texas. Installation by H. C. Lohman Machinery Co., Dallas, Texas.

Six Reasons Why it Pays to Buy a CONTINENTAL Automatic Boiler

- Guaranteed 80% efficiency . . . Fire-tested before shipment . . . Range, 20 to 500 hp.
- Simple, practical two-pass design, for uniform flow of combustion gases through all return tubes.
- Maximum radiant heat transfer achieved by "Spinning Gas" technique for thorough mixing of air and atomized fuel.
- High-CO_2 and low-temperature stack gases — proof of high combustion efficiency.
- Free, rapid water circulation improves heat transfer, keeps heating surfaces clean.
- Easy access to furnace and all return tubes. Refractory baffles and brickwork are not required.

"In designing or modernizing a boiler plant, simplicity of equipment usually means important savings in both labor and fuel. That's just another way of saying it pays to insist on Packaged Boilers.

"Controls are simplified and dependable, and they require practically no maintenance. Cleaning is simplified by easy access to burner and tubes. Air atomizing reduces burner maintenance to a minimum.

"Best of all, the responsibility for this simplified operation rests with one firm only — the manufacturer of the unit. So if we ever do need help, we know exactly where to get it."

For details on the Continental Automatic Boiler, send for Bulletin BE-3

BOILER ENGINEERING & SUPPLY COMPANY, INC.

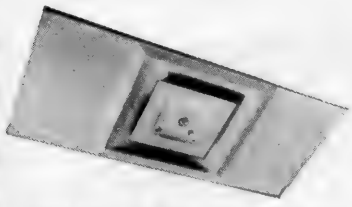
7 Manavon Street, Phoenixville, Pa.

A HALF CENTURY OF BOILER MANUFACTURING EXPERIENCE

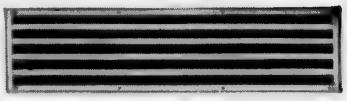
The Continental AUTOMATIC BOILER

THERE'S A KNO-DRAFT DIFFUSER FOR EVERY NEED

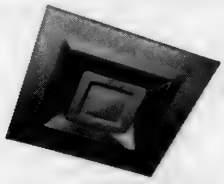
For residential, commercial or industrial installations . . . wherever effective, controlled air diffusion is needed . . . there is a Kno-Draft Air Diffuser to do the job better. Fully adjustable for both air volume and direction, Kno-Draft Air Diffusers are engineered to perform dependably for more working and living comfort, designed to complement any architectural motif. Kno-Draft Air Diffusers are produced exclusively by Connor Engineering Corporation.



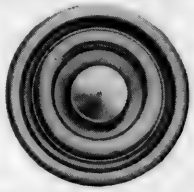
Panel type, for suspended acoustical ceilings. Two styles, three sizes to deliver from 75 to 175 CFM. Sleeve-type damper for instant volume control. One-piece pressed steel furnished in baked-on flat white enamel to match acoustical ceiling panels. Write for Bulletin K-36.



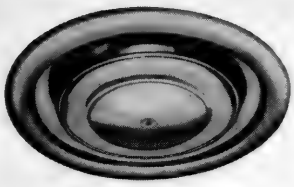
Slotted type KLS, for modern interiors. Effective diffusion assured by adjustable vanes, easy volume control by grid-type damper. Classic lines will enhance any decor. Available in 2-, 3-, 4-, 5- or 6-foot lengths for single or continuous installation. Write for Bulletin K-27.



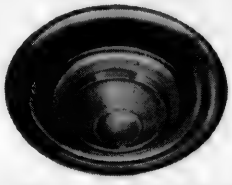
Square types KP and KPT, for flush ceiling mounting. In two smart designs: Type KP, overlap design for plaster ceilings; Type KPT, to snap into T-bar grid of acoustical tile ceilings. Both engineered to assure complete, dependable diffusion. Write for Bulletin K-27.



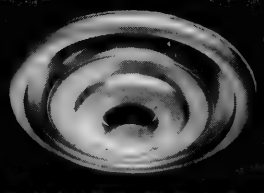
Type SRD, combination supply-return. For use where air is supplied and exhausted through one unit. Supply air cannot "short circuit" into return air opening. Built-in dampers provide independent supply and return air volume control. Of spun aluminum. Write for Bulletin K-20A.



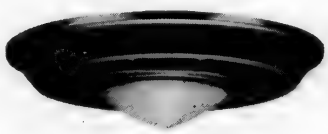
Type KDA for all-purpose use. The diffuser specified most by architects and engineers. Adjustable for air volume and diffusion pattern after installation. Spun aluminum construction. In all sizes for flush ceiling or exposed duct mounting. Write for Bulletin K-20A.



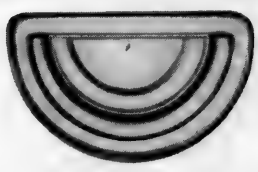
Type KDA with built-in light fixture. Combines attractive lighting and controlled air diffusion. Solves many installation problems. In design and application, this functional diffuser has all the features of the standard type KDA shown at left. Write for Bulletin K-20A.



Type SPKR, combination speaker-air diffuser. For P.A. or piped music systems. Provides same central location for both sound and air diffusion. Accommodates any extended range 8" speaker. Specifications are same as those of standard Kno-Draft types described in Bulletin K-20A.



Type KH, for residential use. Pre-engineered for both heating and cooling applications. Easily installed, may be used with either round or rectangular ductwork. An exclusive integral anti-smudge cone eliminates unsightly ceiling smudge. Provides quiet, draftless air diffusion. Type KH-L, at right above, incorporates a smart lighting fixture that may be used with either a 75- or 100-watt lamp. Illumination and air diffusion are thus combined in a single unit. Both KH and KH-L units are made of spun steel, with aluminum lacquer finish. Write for Bulletin KH-76A.



Type KDA, for butting against walls or columns. Half-round design for use where standard diffusers would not be suitable. Features include Kno-Draft precision air pattern adjustment and sleeve-type damper (optional). Spun aluminum construction. Write for Bulletin K-31.

CLIP THIS PAGE— KEEP IT AS A HANDY REFERENCE GUIDE

CONNOR

kno·draft®

adjustable air diffusers

CONNOR ENGINEERING CORP.
DANBURY, CONNECTICUT

WAGNER ELECTRIC MOTORS...THE CHOICE OF LEADERS IN INDUSTRY

OPEN TYPE DP (Doubly Protected) MOTOR. Dripproof, corrosion-resistant. 1 through 30 horsepower. Other models available in ratings through 500 hp.

TOTALLY-ENCLOSED, FAN-COOLED TYPE EP MOTOR. Fully protected construction. TYPE JP is explosion proof. 1 through 30 horsepower. Other models are available in ratings through 250 hp.

OPEN TYPE OR TOTALLY ENCLOSED MOTORS...

Wagner offers MORE for your motor dollar!

- **MORE POWER IN LESS SPACE**... These motors are built in NEMA frame sizes 182 through 326 U. They pack more power into less space for easier handling and stocking—require less space for installations.
- **CORROSION-RESISTANT FRAMES** ... Both types are built with rugged, corrosion-resistant cast iron frames. Motor feet are cast as an integral part of the frame for maximum strength and rigidity.
- **THE TYPE OF PROTECTION YOU NEED** ... Type DP motors have completely dripproof—virtually splash-proof enclosures; while type EP is totally enclosed, fan-cooled for complete protection; and type JP adds explosion proof features.
- **COOLER OPERATION**... Special baffles direct a cooling flow of air through the DP motor. Types EP and JP are fan-cooled and have ribbed frames to increase the surface area for more efficient cooling.
- **LONGER BEARING LIFE**... These motors can be re-greased when desired to prolong bearing life. Fresh grease can be added—old grease removed through openings provided in the bearing housing.
- **WAGNER DEPENDABILITY**... These two motors have the same high Wagner quality, will give the same long life performance, that have made Wagner Motors a *known* value for sixty-five years.
- Let a Wagner field engineer, expert on motor applications, show you how these motors can be applied to your needs. Call the nearest of our 32 branch offices, or write us. Bulletins MU-202 and MU-203 give complete information on these Wagner Motors. Write for your file copies today.

M57-4

Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

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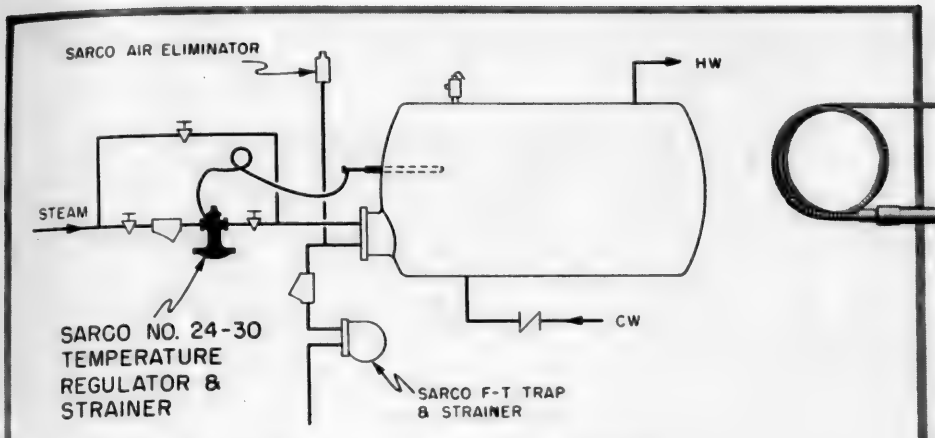
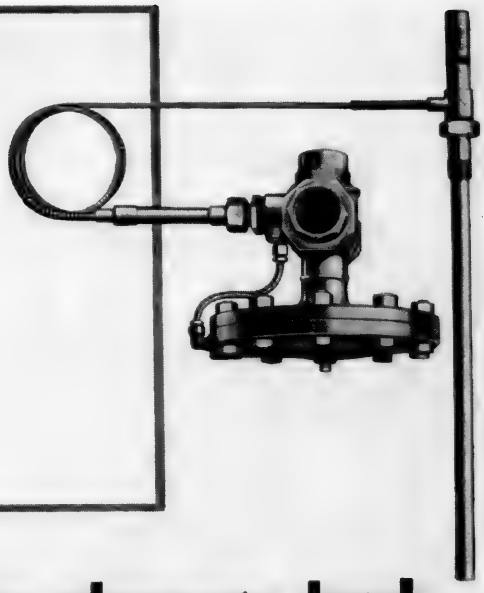
6463 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC



Typical hook-up of Sarco Type 24-30 Temperature Regulator



HOT WATER...in your storage tank

...when you want it...*and at minimum cost!*

That's the performance you get when this Sarco Temperature Regulator stands guard on your water heater.

With fuel representing about 50% of your total direct power costs, it's important that you *get hot water at lowest cost per wash.*

Here's how the Sarco 24-30 Temperature Regulator does the job:

NO OVERHEATING – during periods of no draw-off. The single seated valve shuts tight, prevents creeping of temperature.

LOW INSTALLATION COST – the T R 24-30 is self-contained and self-operated, no need to install compressed air or electric lines.

CLOSE TEMPERATURE CONTROL – thermostat actuates internal pilot valve which immediately opens or closes main valve.

LOW-MAINTENANCE PACKLESS SEALS – trouble-free design eliminates stuffing boxes, no repacking, no sticking or leakage of exposed valve stems.

WIDE RANGE OF ADJUSTMENT—you can adjust this temperature regulator 25° higher or lower than the temperature setting.

So, if you're not satisfied with your hot water service, call your local Sarco representative or write for Bulletin 800 Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.

Need Tempered Water ?

This Sarco Water Blender automatically mixes hot and cold water, delivers blended water at any desired temperature. Factory set for any temperature to 200° F., is easily adjusted to 15° F. lower and up to 40° F. higher than factory setting. Ask for Bulletin 800.

SARCO

SAVES STEAM

improves product quality and output

2046-B

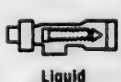
Only Sarco Makes All 5 Types

That's why Sarco can give impartial advice on proper steam trap selection.

Thermodynamic Steam Traps

Thermostatic Steam Traps

Float Thermostatic Steam Traps


Liquid Expansion Steam Traps

Camlift Bucket Steam Traps

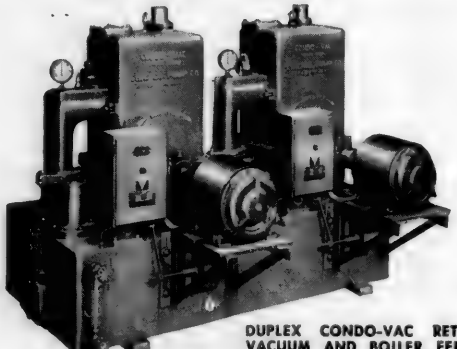
from "Chicago"

A SPECIFIC TYPE OF PUMP for every Steam Heating System

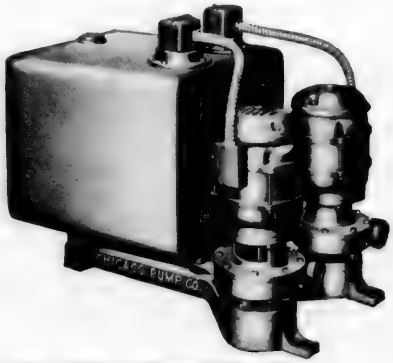
There's a Chicago Pump specifically designed for every type of building service steam heating system. No type of system has been overlooked by our engineers. *For any unusual condition; for below floor returns; for low vacuum systems; for small capacity, high pressure requirements; or for any standard system* . . . there is a Chicago Pump specifically designed 100% for the job. That means, there's no longer any reason for installing a pump that's not 100% suited to meet your needs. And you can be sure with a Chicago Pump that all ratings and receiver capacities meet or exceed standards of the American Society of Heating and Air Conditioning Engineers.

Write for details and free survey of your steam heating, pump requirements.

At left the TYPE AVC CONDENSATION PUMP & RECEIVER—Heavy cast iron receiver with low inlet for floor mounting or shallow pit. Cap. 500 to 10,000 EDR. Pressure 10-30 lbs.

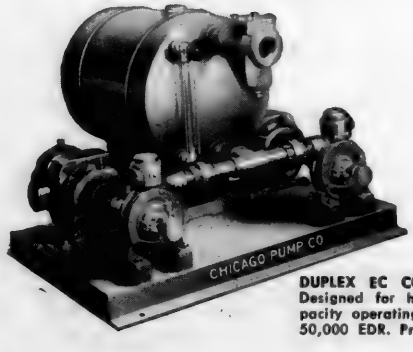


DUPLEX CONDO-VAC RETURN LINE VACUUM AND BOILER FEED PUMP—Designed for vacuum heating systems. Water content remains constant up to boiling point. Cap. 2500 to 150,000 EDR. Pressure to 40 lbs.



SURE RETURN CONDENSATION PUMP & RECEIVER — Condensate flows by gravity from receiver through base to pump. Available in single or duplex units. Cap. up to 75,000 EDR. Pressures, low or medium.

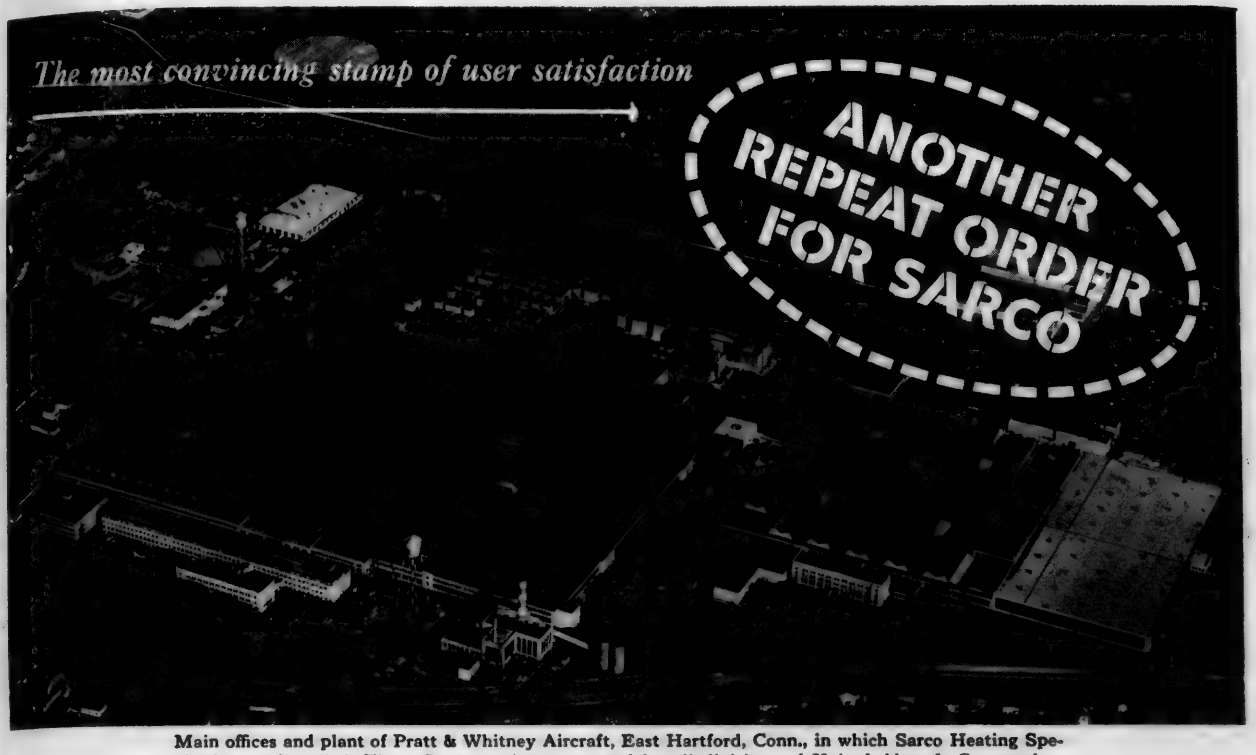
TYPE CLLI VERTICAL CONDENSATION PUMP & RECEIVER—Designed for low return service and underground installations. Cap. 1000 to 40,000 EDR. Pressures 10 to 25 lbs.



DUPLEX EC CONDENSATION UNIT — Designed for high pressure, small capacity operating conditions. Cap. up to 50,000 EDR. Pressures up to 150 lbs.

CHICAGO PUMP COMPANY
Subsidiary of Food Machinery and Chemical Corporation
BUILDING PUMP DIVISION
400 DIVERSEY PARKWAY • CHICAGO 14, ILLINOIS

Condo-Vac ®, Sure Return ®, AVC, LVC, Fire, Hotsie & Circulating Pumps, Pneumatic & Tankless Water Systems . . . Flush Kleen ® Sewage Ejectors, Little Giant ® & Non-Clog Bilge Pumps. Pumps for every industrial use.



Main offices and plant of Pratt & Whitney Aircraft, East Hartford, Conn., in which Sarco Heating Specialties are installed. These Sarco products are used by all divisions of United Aircraft Corporation.

35 repeat orders from United Aircraft

for Sarco Heating Specialties!

First installation in 1933. Thirty-five installations since. That's the 22-year record of Sarco Heating Specialties in plants and office buildings of all United Aircraft Divisions.

35 *large* repeat orders... won by Sarco proved dependability!

Several thousand Sarco steam traps and other Sarco Heating Specialties are on the job at:

Pratt & Whitney Aircraft Div., East Hartford, North Haven and Southington, Conn., *Hamilton Standard Division*, Windsor Locks, Conn., *Sikorsky Aircraft Division*, Bridgeport and Stratford, Conn.

For further information on Sarco heating specialties, Sarcotherm weather-compensated control systems for steam and hot water heating, and Sarcofin finned-tube and baseboard radiation, write Sarco Company, Inc., Empire State Building, New York 1, N. Y.

SARCOfin Radiation

...another Sarco product

APPROVED RATINGS—by Institute of Boiler and Radiator Manufacturers for finned-tube and baseboard radiation.

1-YEAR GUARANTEE against defects in materials and workmanship.

COOPERATION—careful selection of radiation by experienced Sarco and Sarcotherm heating engineers.

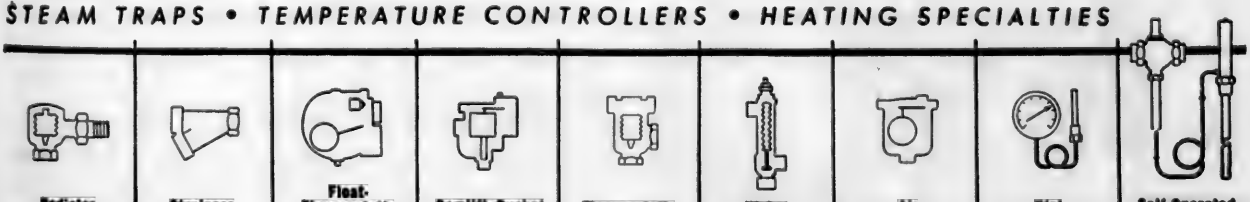
Write for Bulletins

A191-B

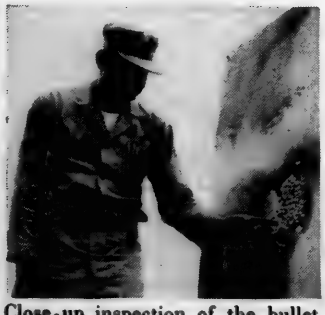
SARCO

Sarco quality assures satisfaction

STEAM TRAPS • TEMPERATURE CONTROLLERS • HEATING SPECIALTIES



LEATHERNECKS FAIL TO FLAKE TI-CO®



Close-up inspection of the bullet holes in TI-CO. Not one sign of coating failure.

Two husky Marines teamed up with a Browning .30 caliber machine gun to pour two hundred rounds of armor-piercing ammunition into a sheet of Inland TI-CO galvanized steel.

Despite the smashing contact of slug after slug, TI-CO showed not a crack, not a chip, not a trace of peeling or flaking. The protective zinc coating on TI-CO stayed put... to the very edge of the holes.

If speeding bullets fail to flake TI-CO... you can be sure that even the most severe fabricating operations or the roughest, toughest handling will not flake TI-CO's coating. That means positive protection for the base metal. No chance for rust to get a foothold.

"I'm a great fan of Inland TI-CO galvanized steel sheets,"

says Howard Houchens, Sheet Metal Contractor on the new Indiana Turnpike

A partner in Apex Heating & Ventilating Company of Hammond, Indiana, Howard Houchens stands in front of one of the five stations along the Indiana Turnpike, in which all the sheet metal work was handled by his firm.

The Indiana Turnpike job is one of the largest single projects Apex Heating & Ventilating Company has ever undertaken. Each station consists of two large buildings, one on each side of the highway. Each building houses a gas station, a gift shop and a complete restaurant. The entire installation required 65 tons of galvanized sheets. And it's all Inland TI-CO.

"We specified Inland TI-CO for the duct work and air handling equipment because it's dependable," says Mr. Houchens. "Its non-flaking quality keeps our labor costs down. With TI-CO, fabricating time in the shop is reduced to a minimum because there are no make-overs due to peeling of the zinc or splitting of the sheets, and machine down-time caused by zinc clogging is eliminated. Most important, TI-CO provides a more attractive, longer-lasting finished installation."

TI-CO is available in cut sheets or coils, in gages 8 to 30 inclusive and widths as great as 60 inches. TI-CO comes with dry, oiled or chemically treated surfaces. Consult your local steel distributor or Inland representative for your requirements.

This is a housing for one of the air handling units being installed in a Turnpike building. On large prefabricated parts such as this, TI-CO's non-flaking feature pays off. They come out right the first time. No "do-over" operations because of peeling, cracking, or flaking along seams—no waste of materials. Thanks to TI-CO . . . no man-hours lost, in the shop or on the job!

TI-CO Galvanized Sheets are now readily available!
The terrific demand for this high quality sheet has kept TI-CO in short supply since its development. Now, additional production facilities have been completed making greater quantities available.

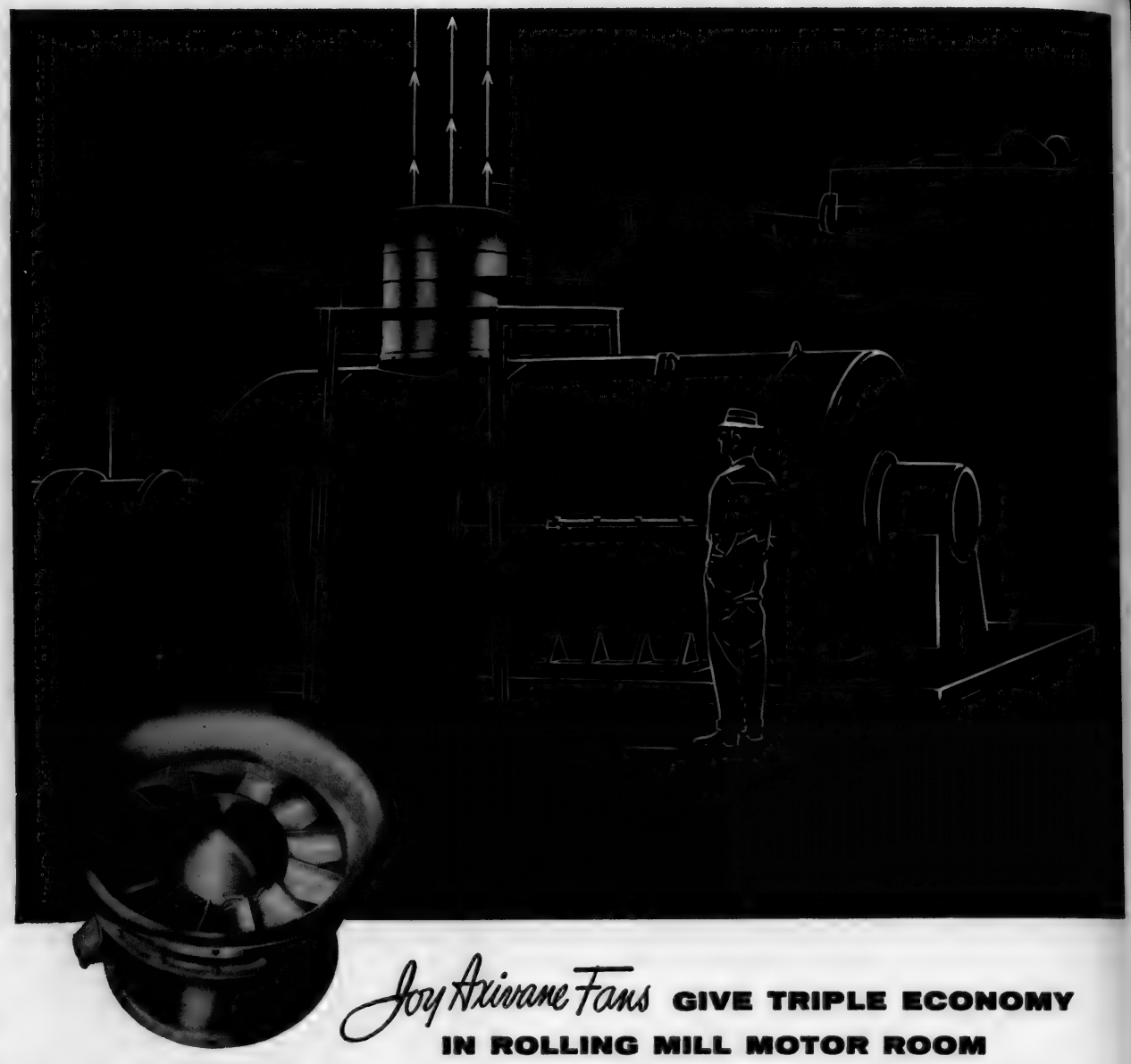
INLAND STEEL COMPANY

38 South Dearborn Street • Chicago 3, Illinois

Sales Offices: Chicago • Milwaukee • St. Paul • Davenport
St. Louis • Kansas City • Indianapolis • Detroit • New York

INLAND TI-CO

Look for this brand—
your assurance of
non-flaking performance



Joy Axivane Fans GIVE TRIPLE ECONOMY IN ROLLING MILL MOTOR ROOM

One of 136 models with volumes to 200,000 CFM and pressures to 11" wg. WRITE FOR FREE BULLETIN 162-40.

THE JOB OF THIS JOY FAN is to cool a drive motor in one of the country's largest rolling mills . . . . good example of the adaptability of Joy fans to unusual ventilating applications.

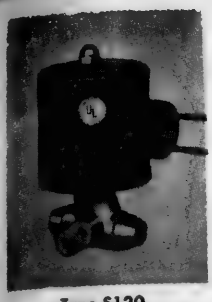
BECAUSE of the in-line design of the Joy fans, no elaborate duct system was required . . . installation was simplified. Because a Joy fan is actually built around its motor, power-loss from motor to fan is negligible. Space requirements, as shown above, are at the irreducible minimum.

JOY AXIVANE FANS will show you new standards in efficiency, compactness, quietness, and outstanding versatility. Get the full story by writing to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

WAW I 8830-162

JOY . . . EQUIPMENT FOR INDUSTRIAL PLANTS . . . FOR ALL INDUSTRY

STATIONARY AIR and GAS COMPRESSORS • NON-LUBRICATED COMPRESSORS • BOOSTER COMPRESSORS
VACUUM PUMPS • PORTABLE COMPRESSORS • INDUSTRIAL FANS • PORTABLE BLOWERS • FOUNDATION
BREAKERS • HOISTS • ELECTRICAL PLUGS, RECEPTACLES and POWER DISTRIBUTION SYSTEMS



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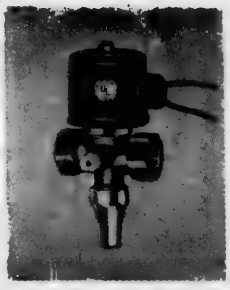

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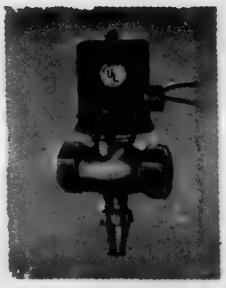

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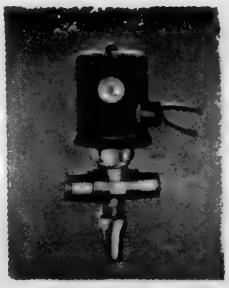

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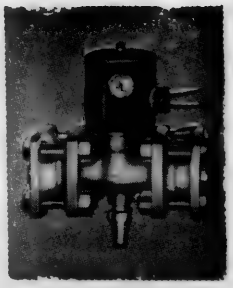
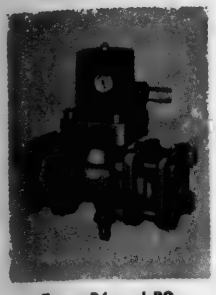
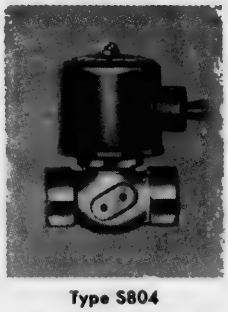


Type R1



Types R6 and R2



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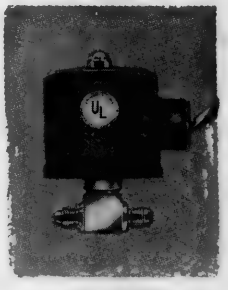

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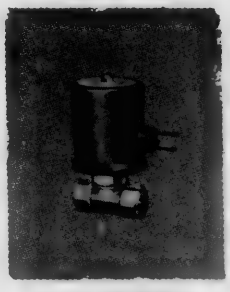

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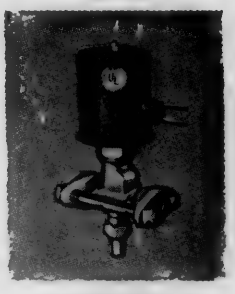
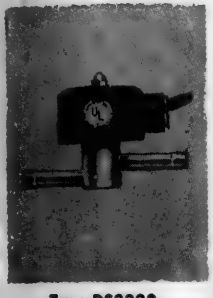


Type M8



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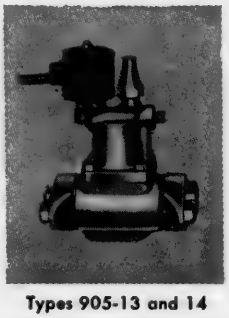
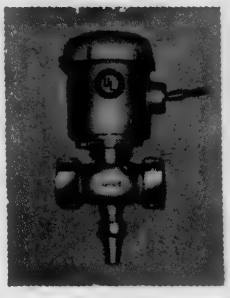


Types 905-13 and 14

Type S608-1



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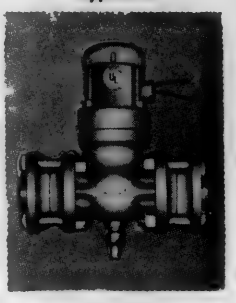

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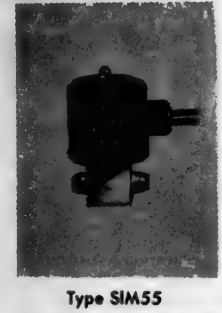
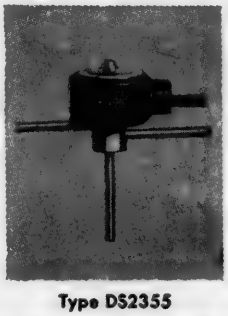
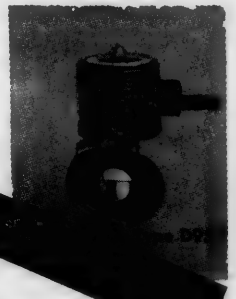


Type SIM55



Type DS2355



Type DS1770

The one complete line of refrigerant controls: Thermostatic Expansion Valves, Refrigerant Distributors, Solenoid Valves, Suction Line Regulators, Flooded Evaporator Controls and Reversing Valves.

whatever the control problem, there's an

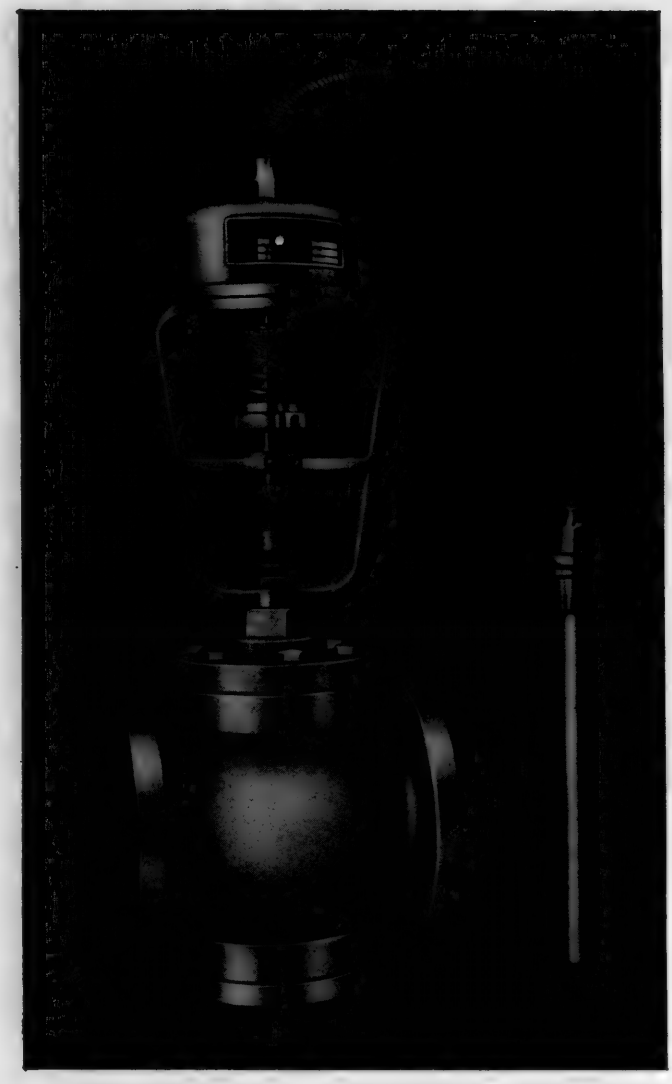
ALCO SOLENOID VALVE

The most complete line for all types of refrigerant service; liquid, suction or hot gas discharge... brine, water, steam and air. Available in sweat or pipe connections.

write for information

INSTANT PROTECTION...

PRECISION CONTROL!

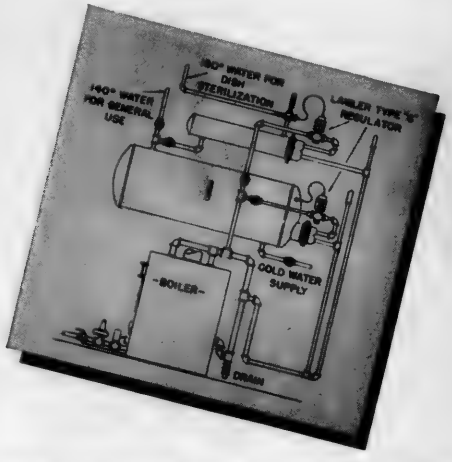


LAWLER TYPE "S" TEMPERATURE REGULATOR

DIRECT ACTING — Accurately controls all steam heating equipment. Protects against over heating... a rise in temperature above setting closes valve.

REVERSE ACTING — For cooling systems and recirculating lines. Rising temperature opens valve... drop in temperature causes valve to close.

THREE WAY — Mixes hot and cold liquids . . . delivers them at a constant pre-determined temperature.



ONE DEGREE OFF — up or down, and the Lawler Type "S" Temperature Regulator is in action... correcting to and maintaining the desired temperature.

Hydraulically formed bellows are non-ferrous, give "hair-line" control with instant response. Highly polished stainless steel valve stem provides friction-free operation for real rugged performance . . . longer lasting durability.

There's no job too tough... too unique for the Type "S". It's available in many variations for any special purpose. In industry, dairies, food processing, Diesel engineering... where ever steam, gases or fluids are used, the Lawler Type "S" Temperature Regulator will do an excellent control job for your customer.

PERFORMANCE TESTED FOR LONGER LIFE

Steam Temperature Regulators
Thermostatic Shower Mixing Valves
Water Controllers
Tempering Valves

DESIGNERS AND PRODUCERS OF THERMOSTATICALLY OPERATED VALVES SINCE 1895

THE *Lawler* Line of **Thermostatic Control Valves**

LAWLER AUTOMATIC CONTROLS, INC., MT. VERNON, N. Y.

Specify RECO

Boiler Plant, West Wing and Mercy Hall—St. Mary's Hospital, Knoxville, Tenn.
Consulting Engineers—A. F. G. Bedinger, Knoxville, Tenn.—H. F. Wilson, St. Louis, Mo.
Architects—David B. Liberman, Knoxville, Tenn.—Maguolo & Quick, Cincinnati, Ohio.
Contr.—John F. Whelahan Co., Knoxville, Tenn.
RECO Representative—Dickey Engineering Co., Knoxville, Tenn.

Hot Water Treatment by RECO for St. Mary's Hospital

When it comes to hot water, a hospital really pours it on. That's why the consulting engineer "prescribed" RECO water heating equipment for the new buildings at St. Mary's.

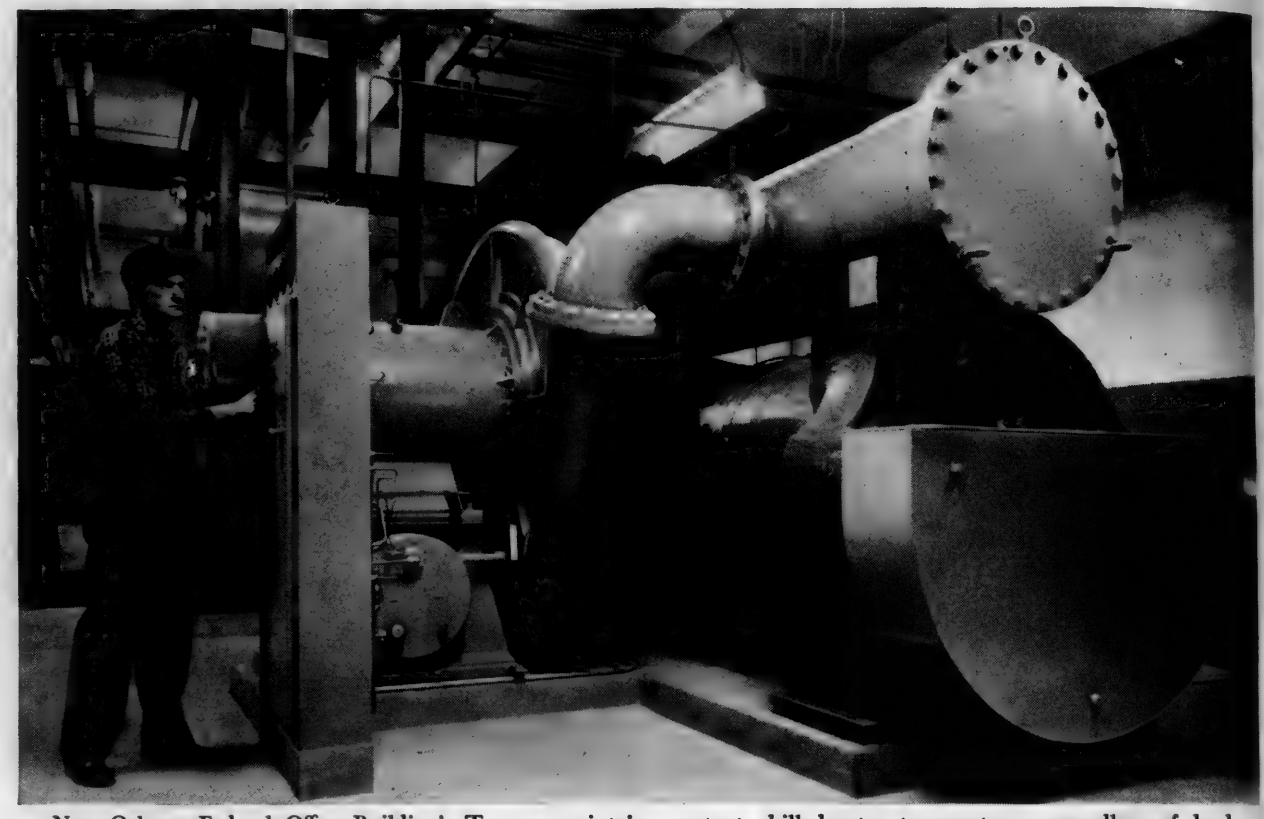
The complete RECO installation includes convertors, storage heaters, expansion and bulk storage tanks. 17 units in all... Guaranteed to keep plenty of rust-free hot water always on tap.

If you're interested in guaranteed top quality heat exchange equipment—delivered quickly and priced right—SPECIFY RECO on *your* next heating job.

Write for free catalogs plus name of nearest RECO representative.

Dept. N, Richmond Engineering Co., Inc., 7th & Hospital Sts., Richmond 5, Va.

RICHMOND ENGINEERING CO., INC.



New Orleans Federal Office Building's Tonracs maintain constant chilled-water temperature — regardless of load.

Tonrac provides air-conditioning load variations from 0 to 100% in New Orleans Federal Building

Teamwork like this brought effective air conditioning to the Federal Office Building, New Orleans. L. to r.: I. A. Lindberg, American Blower; G. M. Graf, group supvr., General Services Administration; E. A. Stack, chief engineer, Federal Building; G. A. Hero III and A. A. Hero, Comfortair Co.

To provide controlled indoor comfort, the U.S. Government installed air conditioning in their New Orleans Federal Office Building.

For the heart of the system, they chose two 300-ton American Blower TONRAC® centrifugal refrigeration machines. Here's why, in the words of Alvin Hero, president, Comfortair Company, Inc., New Orleans air-conditioning contractors:

"After inspecting available units, Tonracs were selected because they were found to be most flexible, easy to install; and they met and exceeded government requirements.

"In this installation, humidity control was the primary factor. Not only was it necessary for the Tonracs to operate at full capacity, but the lower variable — below 10% of capacity — was equally important to keep humidity low at night and during week ends."

If your client's building or remodeling plans include air conditioning, why not call in an American Blower representative at the *planning* stage? American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

AMERICAN BLOWER

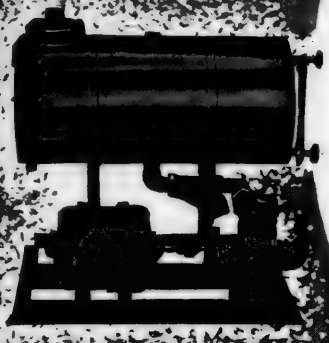
Division of AMERICAN-Standard

Air conditioning equipment for every business

SPECIFY WITH CONFIDENCE

There's a Sl idmore Pump designed for each and every heatin g requirement.

Write for bulletins



TYPE "TM"

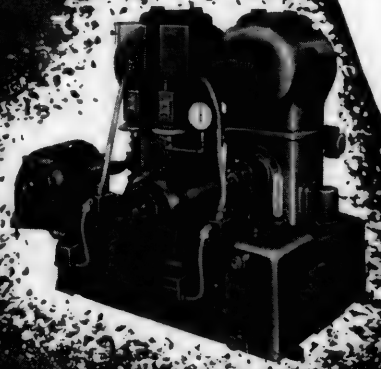
Completely assembled on either steel or cast iron base —capacities, for boilers up to 250 H.P., with discharge pressures to 150 lbs.

TYPE "HS"

Sturdily constructed for dependable service at small investment — capacities ,000 to 65,000 sq. ft. E. D.R., discharge pressures fr m 10 to 75 lbs.

VACUUM TYPE

Automatically adjusts itself to the varying conditions of the system. Efficiency maintained. Capacities ranging from 5,000 to 100,000 sq ft. E.D.R.



TYPE "UV"

Designed for low return installations — capacities, 2,000 to 40,000 sq. ft. E.D. R. and discharge pressures from 10 to 75 lbs.

IDMORE CORPORATION, ST. JOSEPH 5, MICHIGAN

e send bulletins on the following pumps checked below.

TM HS UV VACUUM

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John Carroll University specifies

Youngstown Steel Pipe for new Campus Service Building

This attractive new Service Building, parts of which are now under construction on the campus of Cleveland's John Carroll University, will contain a Gymnasium, Transportation Hall, Student Activities Center and a Student Dining Hall. To coordinate all the structure's physical functions, the University and its architect specified Youngstown Steel Pipe for its dependability and long life.

Youngstown Steel Pipe is made of only the highest quality steel by steelmen with over 56 years of pipemaking experience. All of Youngstown's fully integrated operations—from iron ore mining to finish pipe threading—are rigidly quality-controlled to provide the best steel pipe available anywhere. Why not make Youngstown your continuing specification for long life and trouble-free installations?

For additional information or service, call your local Youngstown distributor—or contact our nearest District Sales Office, today.

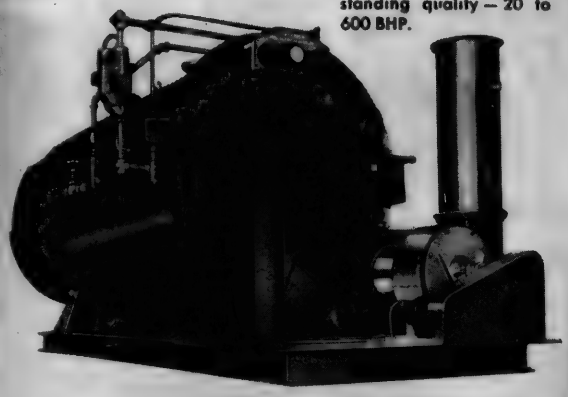
THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
General Offices - Youngstown 1, Ohio
District Sales Offices in Principal Cities

John Carroll University Service Building
Architect: Small, Smith, Reeb and Draz, Cleveland
General Contractor: Roediger Construction Inc., Cleveland
Plumbing & Heating Contractor:
The Gorman-Lavelle Plumbing & Heating Co., Cleveland
Distributor: Grinnell Company, Cleveland

Specify Youngstown and secure these 7 Points of uniform goodness

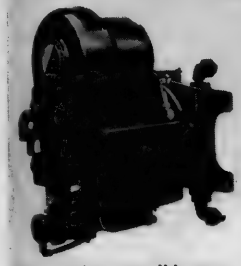
uniform ductility
uniform lengths
uniform threading
uniform weldability
uniform roundness and straightness
uniform wall thickness and size
uniform strength and toughness

A Single Dependable Source that SAVES You Time and Money

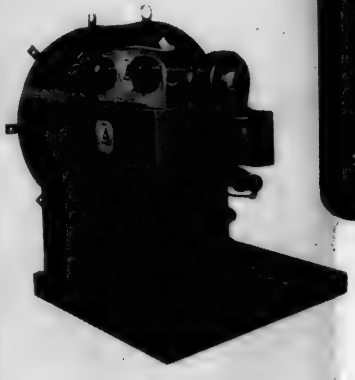


Unit Steam Generators—"Package" Boilers of outstanding quality—20 to 600 BHP.

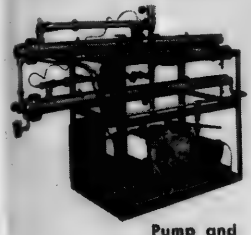
PREFERRED UTILITIES for Automatic Heating



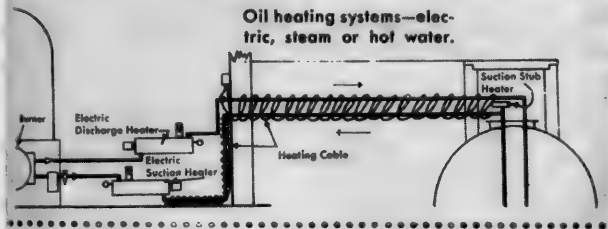
Horizontal rotary oil burners—7½ to 175 gph. Also combination oil- gas burners.



"Thermopak"—packaged automatic oil or gas combustion system for all boilers.



Pump and heater sets—oil delivery sizes from 110 to 1200 gph.



Oil heating systems—electric, steam or hot water.

Meet Your Equipment Needs with

- Unit Steam Generators
- "Packaged" Burner Units
- Horizontal Rotary Oil Burners
- Combination Oil-Gas Burners
- Fuel Oil Heaters and Preheaters—Electric or Steam
- Heating Systems for Fuel Oil Piping
- Oil Pump and Heater Sets
- Heavy Oil Pump Sets
- Draft-A-Justors—Industrial and Commercial

and a Complete Line of Accessories and Specialties for Automatic Oil Burning and Combination Oil-and Gas-Burning Systems

Draft-A-Justors—barometric type—cut boiler stack losses.

Get the full facts on Preferred Time- and Money-Saving Equipment. Mail this coupon today.

PREFERRED UTILITIES MFG. CORP.
1860 Broadway—New York 23, N. Y.

Check the Bulletins You Want

- ☐ Unit Steam Generators Bulletin 2000
- ☐ Oil Burners—Bull. 175
- ☐ Comb. Burners—Bull. 176
- ☐ Draft-A-Justors Bulletin 800
- ☐ Oil Burning Accessories—Bull. 1600

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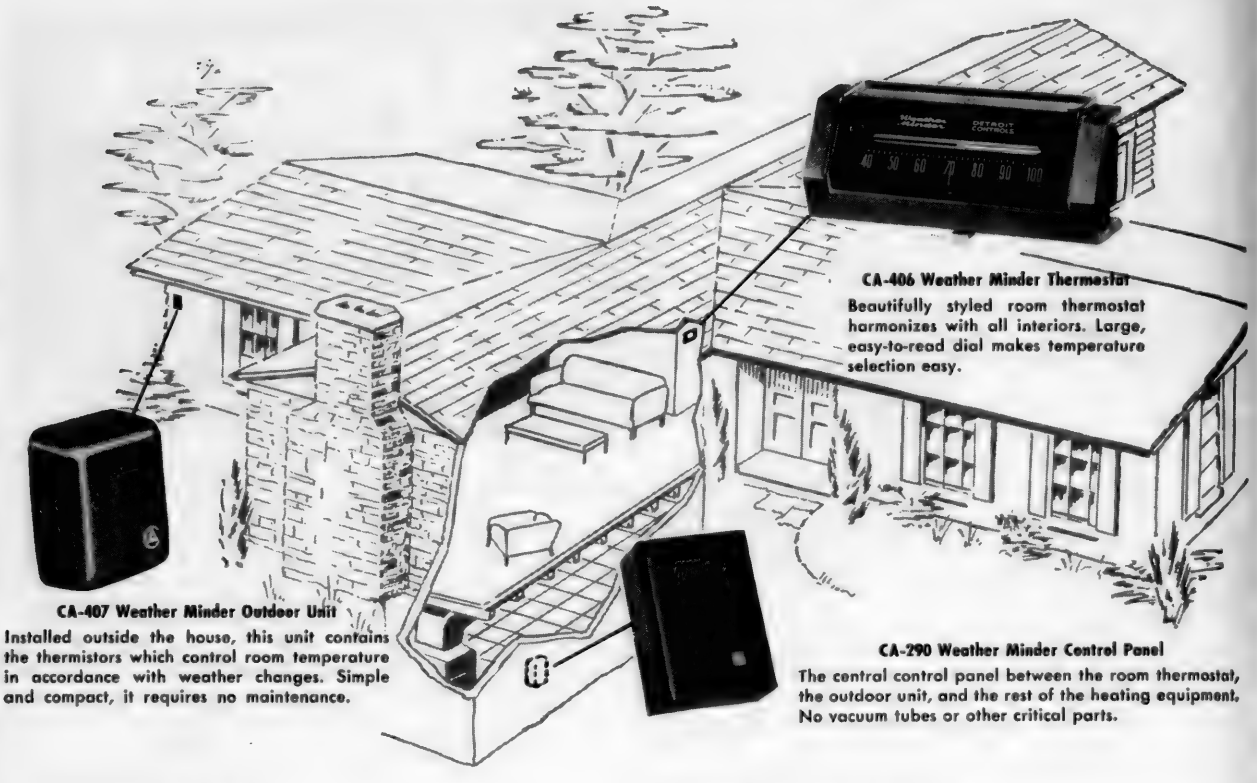
CITY_____ STATE_____

AC

More Heating Comfort

with DETROIT CONTROLS *Weather Minder*

indoor . . . outdoor Thermistor Control System



CA-406 Weather Minder Thermostat
Beautifully styled room thermostat harmonizes with all interiors. Large, easy-to-read dial makes temperature selection easy.

CA-407 Weather Minder Outdoor Unit
Installed outside the house, this unit contains the thermistors which control room temperature in accordance with weather changes. Simple and compact, it requires no maintenance.

CA-290 Weather Minder Control Panel
The central control panel between the room thermostat, the outdoor unit, and the rest of the heating equipment. No vacuum tubes or other critical parts.

WHAT IT IS

The Detroit Controls Weather Minder is an indoor-outdoor heating control system incorporating thermally sensitive resistors called "thermistors". It is a new concept in temperature control, and offers features not available in other systems.

- Low cost—easy to sell.
- No complicated electronic circuits.
- Easy to install.
- Fully automatic.
- Positive, trouble-free comfort control.
- For any type heating system.

HOW IT WORKS

The Weather Minder System automatically raises indoor temperature as outdoor temperature drops, and conversely, lowers indoor temperature during mild weather. As the outside temperature varies, the outdoor unit alters the control point of the room thermostat, to provide just the right temperature for maximum comfort.

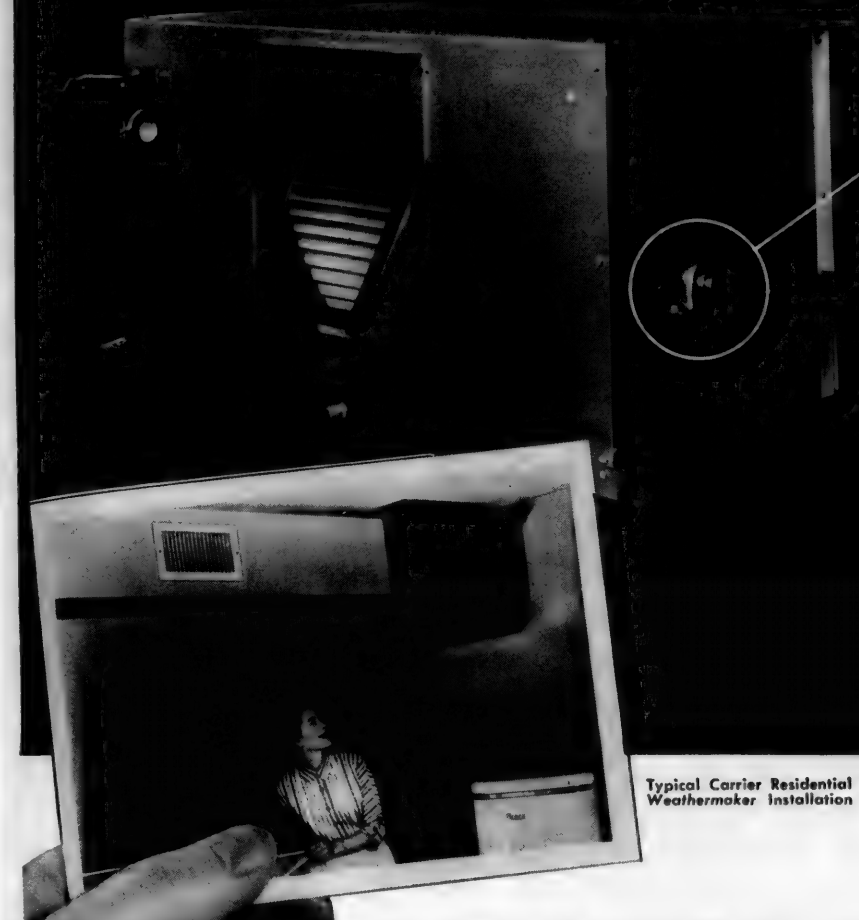
Get all the facts about the Weather Minder System — send today for Bulletin 267.

5900 Trumbull Avenue
Detroit 8, Michigan

DETROIT CONTROLS
CORPORATION
Division of AMERICAN-Standard

Canadian Representatives: RAILWAY AND ENGINEERING SPECIALTIES LTD., Montreal, Toronto, Winnipeg

Consumer approach to design problem revealed... by this Fafnir-equipped



Typical Carrier Residential *Weathermaker* Installation

Just a glance at this *Residential Weathermaker* will show you how Carrier designers have catered to the interests of the consumer. The Fafnir super-quiet, permanently-lubricated pillow block circled above is a case in point. Installed on condenser units and fan, these Fafnir rubber-cushioned units eliminate a troublesome servicing problem and operate whisper-quiet. There are six of them on this *Weathermaker*.

By careful study and research into the requirements of residential heating and air-conditioning, Fafnir has developed a line of ball bearings and ball bearing units best suited to residential service. Consequently these units are contributing much towards the consumer acceptance of air-conditioning. Here is a typical example of the Fafnir "attitude and aptitude" . . . a way of looking at bearing problems from the manufacturer's viewpoint and an ability to supply the right bearing for the specific application. Perhaps they represent your means of solving a bearing problem effectively and economically. Consult your Fafnir Bearing Specialist, The Fafnir Bearing Company, New Britain, Conn.

FAFNIR
BALL BEARINGS
MOST COMPLETE LINE IN AMERICA

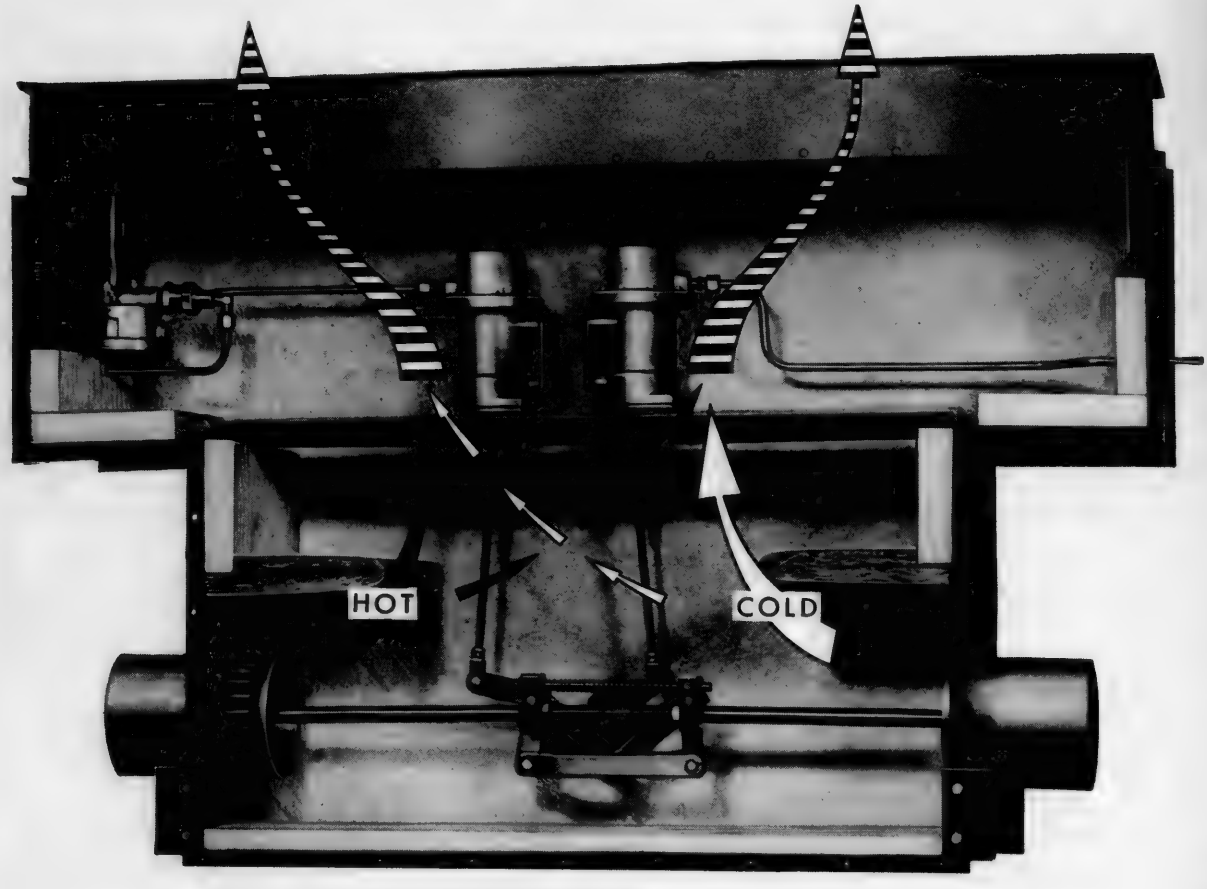
FAFNIR RPB BALL BEARING UNIT

. . . one of a line of air-conditioning ball bearings and ball bearing units. Features include wide inner ring ball bearings with self-locking collar (easiest of all to install) super-quiet bearing construction, Fafnir Plya-Seals (contact-type), plus electric-current-conducting rubber grommets. Write for bulletin.

How **ANEMOSTAT.**

All-Air Constant Volume

High Velocity units operate



Here is a vitally important advance in the field of air distribution. Anemostat All-Air High Velocity units, *with new simple automatic controls,* deliver constant volume, no matter what the fluctuations from 1:4 or 4:1 on inlet pressures of either the hot or cold valve.

Each unit is a single package including the controls and integral thermostats, if required. There is complete accessibility of all controls through removable diffusers. No access panels are required. Capacities of CONSTANT VOLUME units can be pre-set at the factory.

These Anemostat CONSTANT VOLUME units

- Assure scientific draft-free distribution of air.
- Are available in 100% induction units.
- Include Anemostat die-cast metal rocket-socket valves. More than 50,000 of these valves are in service, and not a single one has needed maintenance.
- Operate on standard 15 lb positive acting compressed air systems.

Each unit contains a micropressure regulator in the box, sensitive to .02 static pressure. This in turn operates a pneumatic motor and independently maintains by adjustment constant volume, while the wall mounted or integral thermostat controls the outlet mixture temperatures.

Write on your business letterhead for your copy of

New Anemostat Selection Manual 60

to Anemostat Corporation of America, 10 East 39 Street, New York 16, N. Y.

ANEMOSTAT: The pioneer of All-Air Velocity Systems

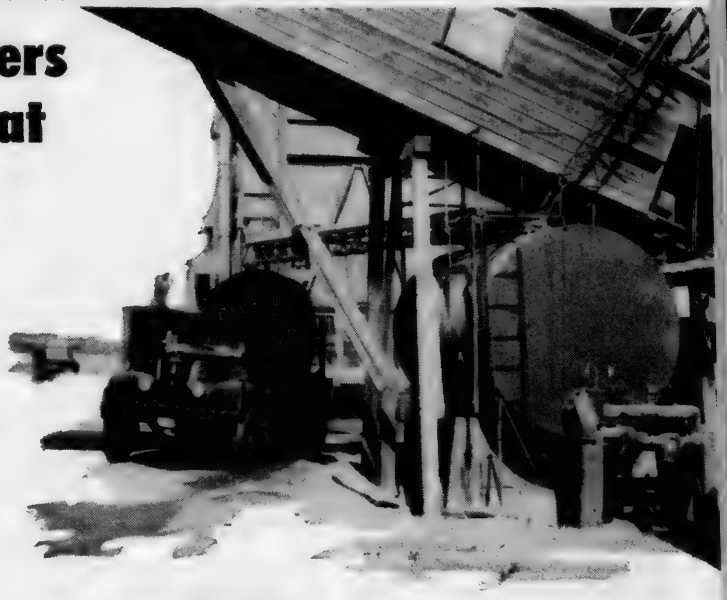
Stepped-up Pace of Winter Construction Sparks Demand for Hot Ready-mix

Chicago, Ill. This city experienced a tremendous winter building program. Modern steam boilers in ready-mix plants, such as Consumers Company, are big factors in helping to deliver steady supplies of hot ready-mix to both commercial and residential projects.

The experience of the Consumers Company is another example of how modern Cleaver-Brooks boilers can serve *all types* of industries, maintain steady supplies of low-cost steam in volume for various uses . . . and with reductions in maintenance expense.

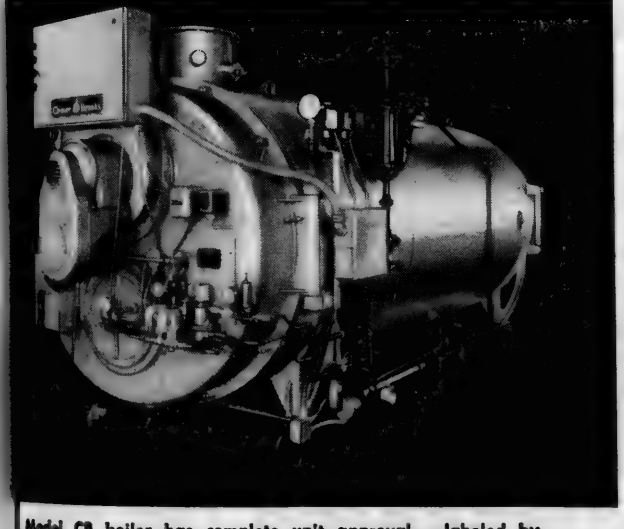
Cleaver-Brooks Company offers owners, engineers and architects complete assistance in any and all boiler modernization programs.

Four Cleaver-Brooks boilers supply steam in volume at low cost . . . boost output at Consumers Company



At Consumers Company's Hillside, Ill., plant it was noticed that there was an improvement in efficiency and lower operating cost after installation of the new 150-hp Cleaver-Brooks packaged boiler. Since it is automatic, the boiler requires a minimum of attention. It supplies adequate steam at between 20 and 40 lbs. for all winter operations at this plant, and that includes heating sand and water for operating readiness at all hours.

Consumers Company now owns *four* Cleaver-Brooks 150-hp boilers. All replaced older boilers in four plants located in the greater Chicago area.



Model CB boiler has complete unit approval — labeled by Underwriters Laboratories and Canadian Standards Assn.

Heats 5000 tons of sand

At the Hillside plant, roughly 5000 tons of sand (pile is 30 feet high) are heated with steam. Steam from the 150-hp CB boiler fed through feeder lines also heats all water used by the plant. Air on truck controls mixture and helps agitate the mix on way to job.

America's most modern boiler line

Pictured here is the Model CB boiler installed at Consumers Company — one of 19 sizes, 130 models in the 15 to 600 hp range. Cleaver-Brooks boilers, with their four-pass, forced-draft design and automatic programming of operation from low to high fire, assure 80% efficiency on both oil and gas fuels. Hinged and davited doors simplify tube cleaning and maintenance. Truly America's most modern boiler — efficient, safe and built for years of dependable hot water and steam service. Write for details. Cleaver-Brooks Company, Dept. D, 315 E. Keefe Ave., Milwaukee 12, Wisconsin.

Cleaver Brooks

ORIGINATORS OF SELF-CONTAINED BOILERS

How about **HIGH TEMPERATURE WATER** *for your heating or processing needs?*

C-E La Mont Controlled Circulation Hot Water Boiler

ADVANTAGES

1. Complete control over HT water movement in both system and boiler.
2. No separate boiler pump is required since low pressure loss is inherent.
3. Pressurized operation with oil or gas means no induced draft fan.
4. Single-pass design—no baffles—means cleaner boiler and lower draft loss.
5. More efficient heating surface can be arranged because of controlled, positive circulation.
6. Any fuel—oil, gas, coal, or any combination of fuels.
7. Other features such as: gastight, welded steel casing . . . fewer headers, all of which are accessible.

If you are planning a new installation for space or process heating, you may be overlooking a good bet if you don't consider high temperature (HT) water as well as steam. Both have their advantages—and Combustion can serve you either way—but there are many cases where HT water is decidedly advantageous from both economic and operating standpoints. A comparatively new development in this country, high temperature water (temperatures up to 470 deg. F with pressures to 500 psi—higher if required) is applicable to the heating and processing needs of industrial plants, large buildings and institutions, and military bases.

Here are some of the advantages inherent in high temperature water systems:

1. The higher available heat in HT water—many times that of steam at the same pressure.
2. Closer control of temperature.
3. Heat loss is lower with the HT water closed system . . . unused heat returns to the boiler . . . no condensate return lines.
4. No elaborate feedwater treatment required. Make-up requirements are exceptionally low.
5. Steam traps not required—trap problems and attendant expense are eliminated.
6. No blowdown losses . . . no safety valve vent losses . . . no condensate losses.

If HT water is best for your requirements, you can realize its advantages fully with a C-E La Mont *Controlled Circulation* Hot Water Boiler. The basic design of this boiler is not only ideally suited to the generation and distribution of heat in an HT water system, but provides the specific advantages listed in the box opposite. Moreover, it is backed by wide application experience both in this country and abroad.

If you're interested in the possibilities of HT water, we'd like to send you our new catalog, No. HCC-2. B-8378

COMBUSTION ENGINEERING

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

Get Peak Filtering, Drying and Acid Removal at All Times...

with SPORLAN *Catch-Alls*

Not in a By-Pass

Whether your job calls for sealed or replaceable core Catch-Alls... for refrigeration or for air conditioning installations all the way up to **100 TONS** Refrigerant 12, nothing matches the Peak Performance of the famous Sporlan molded porous Catch-All Cores.

They keep refrigeration and air conditioning systems so perfectly clean, perfectly dry and acid-free because... **They cannot powder... they cannot pack**

The refrigerant cannot by-pass or channel around them

They offer full flow capacity with negligible pressure drop through superior design

They are activated to a high degree of dryness, then sealed to insure Peak Performance when installed, so, for Peak Filtering, Drying and acid removal at all times... buy Sporlan Catch-Alls from your wholesaler today.

SPORLAN

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EXPORT DEPT. AD. AURIEMA, INC., 89 BROAD STREET • NEW YORK 4, N. Y.

THIS NEW VACUUM HEATING PUMP IS SIZED TO ACTUAL JOB REQUIREMENTS

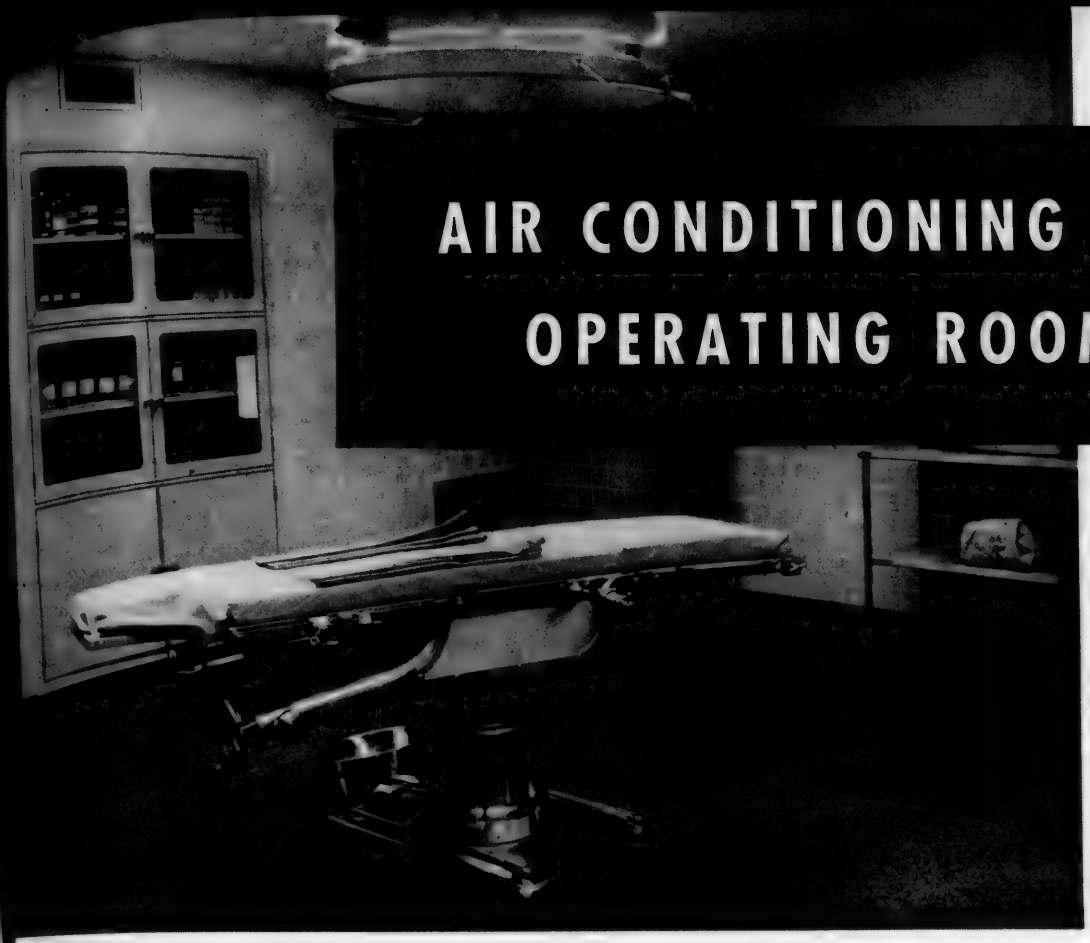
It's the Nash CSM

No longer is it necessary for the Engineer to accept a vacuum heating pump with air and water capacities based inflexibly upon square feet of equivalent direct radiation. With the flexible Nash CSM he can provide for proper air capacity in accordance with his judgment and experience. For the individual capacities of the separate pumps on the CSM may be varied within a wide range, without buying an oversize receiver and oversize water pumps.

These pumps possess many other features which permit a more efficient utilization of fuel and minimum use of electric power. Low, low, returns reduce installation costs and usually eliminate putting the pump in a pit. Simplicity and efficient operation reduce supervision and maintenance costs. Information regarding this new heating pump development is available immediately upon request.

- Increased air capacity induces rapid system response without wasteful overheating.
- Separate air and water pumps individually selected to meet actual job requirements.
- Control system that operates individual pumps only when needed.
- Flexibility permitting addition of radiation without changing basic pump installation.
- Low, low, return line connection.

NASH ENGINEERING COMPANY
438 WILSON, SO. NORWALK, CONN.



AIR CONDITIONING THE OPERATING ROOM

WALTER W. TREICHLER, JR.
Machinery and Systems Division, Carrier Corp., Chicago, Ill.

Guideposts in the design of an air conditioning system for a hospital operating room, that are helpful to both the designer and the contractor who installs the system.

AIR CONDITIONING a hospital operating room presents a major problem to the engineer, for it requires close cooperation between architect, contractor and an experienced air conditioning manufacturer. Overcoming the hurdle virtually assures continued good business to the designing and installing team.

The only pattern that can be drawn in a hospital air conditioning program is in the spaces receiving priority. Operating spaces are most important. Delivery rooms and patient rooms follow immediately after. Laboratories, public areas and administrative offices, in this order, are the last to be tied into an air conditioning system installed according to a planned schedule.

In designing air conditioning for the operating room, provisions must be made for close control of temperature and humidity plus provision for high standards of air cleanliness and distribution. Here are some good general guides to be followed:

1. No less than 55% relative humidity should be maintained the year-round to minimize the danger of static electricity.
2. Air should be obtained solely from the outside and there should be a positive exhaust system.
3. Air conditioning equipment must not be located within the operating room due to the danger of sparking and air contamination, unless equipment conforms to special requirements of city, county or state codes and National Board of Fire Underwriters' Pamphlet No. 56.
4. Controls or other electrically-operated equipment with open contacts must not be installed in locations where combustible anesthetics or disinfectants are used or stored.
5. All local codes, state laws, and NBFU and National Fire Protection Association recommendations should be investigated and observed.

Guideposts in Design

Design conditions for operating rooms must be a compromise between the requirements of the patient and those of the surgeon and operating staff. The problem is further complicated by the necessity for maintaining a high relative humidity between 55 to 60% to avoid the possibility of static electricity discharges.

Suggested design dry bulb conditions have ranged from 68 to 80 deg F, but cumulative experience indicates that the most satisfactory range is 72 to 75 deg F, with the lower temperature preferred.

Since the surgeon or his assistants may be working under tension and with extreme concentration, the annoyance of perspiration or fogging of eyeglasses is an ever-present possibility. The surgeon can touch only sterile things, so when his glasses fog or there is perspiration on his forehead, some member of his staff must correct the situation.

All perspiration contains bacteria to some degree and

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must be kept out of an open incision to prevent post-operative infections. Fogging of glasses is mainly a function of room dewpoint, though it is affected to some degree by the relative humidity. Conditions of 75 deg or lower with 55% relative humidity will prevent fogging and perspiration in virtually every case.

Room design conditions must be maintained 12 months of the year. This means that an effective form of humidification must be provided for winter operation. Wall insulation and double or triple glazing must be installed to prevent condensation and downdrafts at outside walls in regions where sub-freezing temperatures occur.

Air: In and Out

A 100% outside air supply is recommended for hospital operating rooms. The principal reasons for this are:

1. Assurance of adequate ventilation.
2. Avoidance of recirculating air-borne bacteria.
3. Maintenance of minimum acceptable anesthetic concentration in operating area.
4. Elimination of objectional odors.
5. Prevention of infiltration of contaminated air from other areas.

Return air should not be recirculated in a hospital, though it is practical in some general areas, to reduce refrigeration capacity and operating costs. Recirculation of air to operating rooms is prohibited by most local and state building codes.

Frequent air changes using outside air are required to dissipate usually high and concentrated sensible heat loads. Supplying sufficient volume with no drafts is one of the intricate problems calling upon the best skill of the air conditioning designer. Drafts are serious because they can induce shock in the patient as well as carry impurities into an open incision. They can also be an extreme source of annoyance and distraction to the operating team.

One solution to the problem is the use of a single ceiling diffuser. In general, this is the answer in rooms with fairly high ceilings and moderate floor area. Unfortunately, many of the newer hospitals have operating rooms with low ceilings and small floor areas, and there is no room to install the ductwork to supply the ceiling diffuser. In such applications, it is necessary to resort to double deflection sidewall outlets, selected because of their low discharge velocities. A shallow plenum above a perforated ceiling is another possibility.

A second design problem occurs in maintenance of the proper air balance between the operating room and surrounding areas. A slightly positive pressure should exist inside the operating room to prevent infiltration of contaminants. Conversely, the pressure difference should not be so great as to permit combustible aesthetic fumes and odors to be dispersed into corridors instead of exhausted externally.

Many new hospitals have adopted the arrangement shown in Fig. 1 in which two operating rooms are served by an adjacent sterilizer room. Operating room air is exhausted to the sterilizer room by undercut doors or louvers in the doors. Air velocity through or under the door should not exceed 380 fpm. Air is removed from the sterilizer room through hoods over the sterilizers, or simply through exhaust openings in the walls or ceiling. The exhaust system must be explosion proof and electrical fixtures in the sterilizer room, as well as in the operating room, should also be explosion proof.

Some anesthetics are heavier than air and tend to concentrate near the floor. Some diffuse very rapidly in air and their concentration would not necessarily vary at different levels in the room. Others, such as ethylene, are lighter than air and would concentrate near the ceiling. To cover all eventualities then, exhaust outlets should be provided near the ceiling as well as near the floor.

Doing the Job

Factory-built spray-coil air conditioning units are frequently used in operating room air conditioning design.

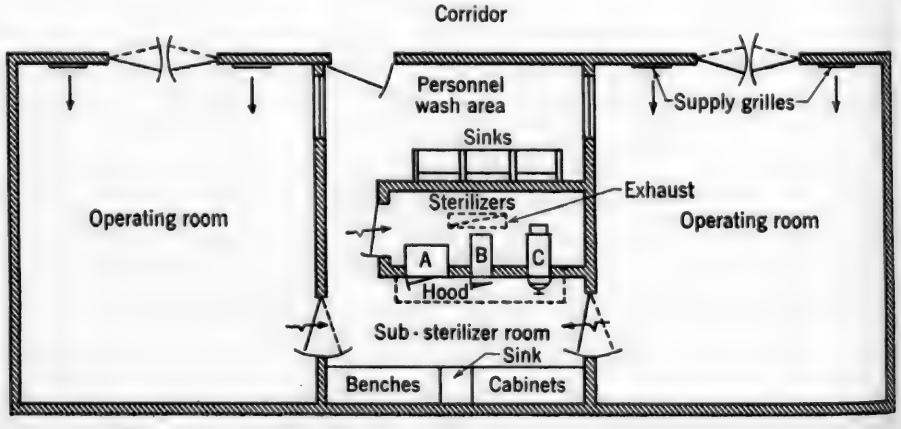


Fig. 1. Typical layout of a surgery. Air conditioning equipment is remotely located. Hood over the front of sterilizers has a separate exhaust.

A - Warming cabinet for blankets, linen, etc.
B - Surgical instrument sterilizer
C - Surgical instrument washer and sterilizer

Advantages of this type equipment include:

1. Winter humidification can be provided without auxiliary equipment.
2. Flexibility of components and controls.
3. Ease of maintenance.
4. A complete year-round system at low installation costs.

Use of a direct expansion coil in this type of unit would violate Safety Code for Mechanical Refrigeration (ASA B9.1, 1953). This unit should be equipped with a dehumidifying coil in which chilled water is circulated. An approved unit layout with controls is shown schematically in Fig. 2.

Where it is not feasible to use a spray-coil unit with a chilled water coil, a satisfactory installation can be made using a self-contained air conditioner, Fig. 3. In such instances, certain additions and modifications must be made to these units. To meet ASA B9.1 safety code requirements: (1) No more than 20 pounds of a Group 1 refrigerant* is permitted in each of the unit's circuits, and (2) the unit and electrical components of the control system must be placed outside of the operating room. Pneumatic controls are preferred, because they present less of an explosion hazard and are easier to maintain.

Where the self-contained unit is used, a separate spray chamber should be provided in the discharge air ductwork after the reheater to provide the proper degree of humidification for intermediate season and winter operation. City water should be used to comply with sanitation requirements. Any excess water should be wasted to the drain. Eliminators at the end of the spray chamber are also a precautionary must. They may be the standard 3-bend type, provided face velocity is kept below 500 fpm. Easy access to the chamber for servicing and cleaning must be provided.

Regular window unit type air conditioners do not meet standards of the NBFU without extensive modification. The cost of making the modifications is prohibitive, and even if the units did comply with these recommendations, their degree of air cleaning is inadequate. Their use for operating rooms is definitely not recommended.

*Group I refrigerants include: Carbon dioxide, Carrene 1, Carrene 7, Freon 11, Freon 12, Freon 21, Freon 22, Freon 113, Freon 114 and Genetron refrigerants with chemical compositions corresponding to those in the Freon group listed.

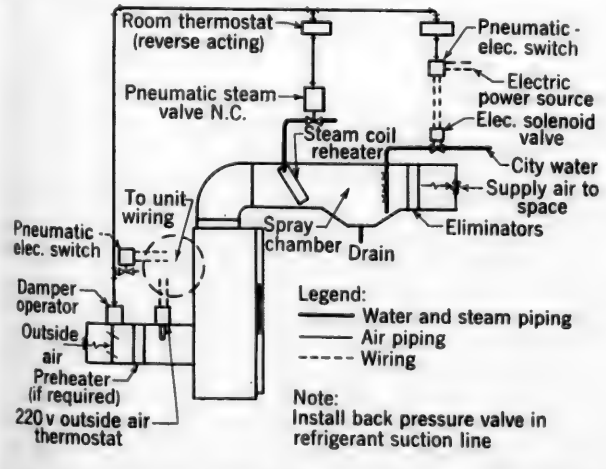


Fig. 2. Schematic control diagram for a self-contained unit with pneumatic controls.

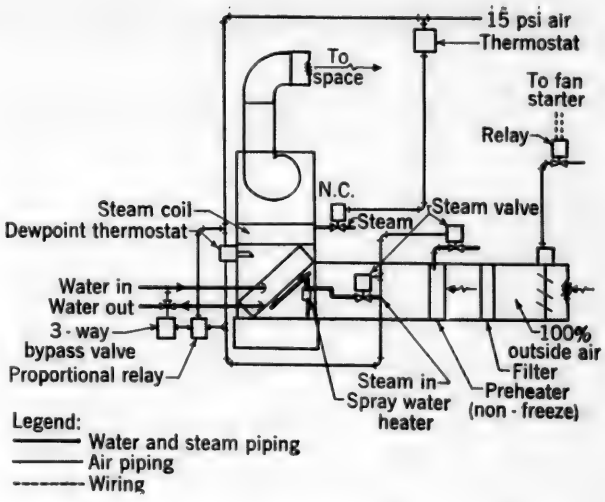


Fig. 3. Control diagram for a hospital operating room served by packaged spray coil unit.

Surgically Clean Air

Filtration of air entering operating rooms must be of the highest efficiency. Where extremely dirty outside air is encountered, and this applies in almost any large city, electrostatic filters should be used. Pre-filters of the normal cleanable or disposable type installed ahead of the electrostatic filters will remove larger particles thereby reducing maintenance of the electrostatic units. The standard throw-away filters may also follow the electrostatic filters catching dirt which may be blown off the electrically charged grids in the event they are not maintained properly or fail to operate. Needless to say, all filters should be located where they can be easily serviced. Actual sterilization of the supply air by means of ultra-violet lamps has been incorporated in some instances, although the necessity for this has not yet been definitely established.

It cannot be over-emphasized that all equipment used in an operating room air conditioning system must be accessible for cleaning.

Frequent cleaning of all components — coils, fans, sprays, ductwork, and outlets is a vital consideration in insuring a safe and satisfactory system. Cleanout doors should be installed in ductwork, especially where coils are located. Outlet grills should be detachable, so that accumulated secondary air dust can be removed. The conditioning units should also have access panels or regular cleanout doors provided in fan, filter, and spray sections.

Handy Check Points

Based on experience gained from many installations, the following figures can be applied, with judgment, to check calculations made for air conditioning individual operating rooms:

1. Refrigeration per room (assuming 16 x 20 ft as average sized operating room in hospital) ..... 3 tons
2. Outside air 100%
3. Air changes per hour ..... 10 to 15
4. Air quantity ..... 2 cfm per sq ft

All Electric Symposium Covers

Air Conditioning and Heating

MEETINGS designed to inform the architect and engineer as to the importance of all-electric air conditioning and heating, were arranged as a symposium by the Appalachian Electric Power Company at the Hotel Patrick Henry, Roanoke, Va., March 18 and 19. Sessions were planned to cover central plant motor driven summer air conditioning equipment, self-contained summer air conditioning units, electric space heating, determining distribution and controlling the heating and cooling effect, heat pumps—central plant systems, heat pumps—self contained units, heat pump installation, and electricity for heating and cooling.

The group of 175 men were welcomed by R. E. Hodges, assistant general manager, and G. L. Furr, vice president and general manager, Appalachian Electric Power Co., and P. D. Brooks, commercial vice president, American Gas & Electric Service Corp.

Comments are given regarding some of the talks.

In a talk on centrifugal machines, W. G. Wassmandorf, The Trane Company, stated that centrifugals have a number of advantages over reciprocating compressors as:

Better control, capacity can be modulated down to a lower percentage of full load, unit is quieter in operation, power requirements per ton of cooling are less with a centrifugal, particularly at light loads, and less maintenance is required. The disadvantage is that the centrifugal is a water chilling machine whereas reciprocating compressors can be used in a direct expansion system.

W. B. Cott, Westinghouse Electric Corp., in describing reciprocating compressors, differentiated between the open type and the hermetic type. In spite of the many parts required, the reciprocating compressor has many favorable features. Hermetic motors are allowed to operate high overloads to make full use of the cooling effect of the return low-side refrigerant gas. Various design features of this type compressor were described.

The self-contained air conditioner for commercial service was described by W. G. Wassmandorf in a second paper. Packaged self-contained units are designed to meet average conditions, and if the conditions are too far from normal, the system may not be satisfactory unless it is designed and built-up specifically for the job. A packaged unit should never be expected to give the close control of air distribution obtained with a built-up system.

Electric Space Heating

Two sessions were devoted to electric space heating, during which the following six papers were presented:

Commercial Space Heating, by C. F. Kreiser, Edwin L. Wiegand Company.

Electric Heat Proves Practical for Schools, by Robert L. Boyd, Jr., Electromode Division, Commercial Controls Corp.

Heating Hospitals Electrically, by W. G. Thompson, Edwin L. Wiegand Company.

An Architect's Viewpoint on Heating Schools Electrically, by Charles W. Cole, Jr., Charles W. Cole & Son

Practical Electric Heating—Design and Application, by Lowell R. Mast, Electromode Division, Commercial Controls Corp.

A Building Contractor's Experience With Electric Heating, by Jack R. Worthman, vice president, John R. Worthman, Inc.

Control of Heating and Cooling

W. E. Hood, Carrier Corp., spoke on Air Distribution and Control of Heat Pump and Resistance Heating System. He said that the inherent qualities of an all-electric heat pump system are a distinct advantage in terms of air distribution and comfort control.

Melvin A. Ramsey, Worthington Corp., covered Heating and Cooling Load Determinators. He said that although there is a much closer approach to standardization in determination of such loads, there is still something to be learned. There is considerable latitude for initiative in avoiding coincidence of peak loads, in discharging air of greater heat content than the outside air during the cooling period as well as using waste heat from one area to help heat another.

Maintenance Contracts and Service were described by S. Lebair, York Corp. Various types of contracts were covered, and also the question of inspection and maintenance.

Heat Pumps

Herbert Wolf of Worthington Corp., spoke on the Single Stage Heat Pump Design for Central Plant System. He touched on various points in regard to design and operation. He envisioned further improvement in the design of compressors, greater acceptance of the heat pump principle, and additional refinements in features, controls and application. He said that it is safe to assume that future electric rates will be a stimulating force in the acceptance of the heat pump.

The York compound air source heat pump was described by R. G. Werden, York Corp. This type unit, it is claimed, can cool and heat any commercial or industrial structure without the need of any supplementary resistance heating, by extracting all of the heat needed from the outdoor air. The only fuel is the electrical input to the compressors.

In his talk on Design and Operating Aspects of Packaged Heat Pumps, G. L. Biehn, Westinghouse Electric Corp., stated that the packaged heat pump meets the requirements for complete year-round comfort and in some respects provides comfort superior to that obtainable by other means. Simplicity of design and installation, flexibility, efficiency and automatic control are provided within a single unit operated by a single energy source without combustion.

A paper on Electric Driven Refrigerating Machines Compared With Absorption Machines, was given by E. R. Ambrose, American Gas and Electric Service Corp. He compared the design, the operating and the application features of the two systems.

Heating Houses by Electricity

W. J. NOVAK
Assistant Editor, Electrical Construction and Maintenance

Electric space heating has been installed in some 300,000 American homes. According to NEMA, there will be a rapid rise in this type of heating for residences during the next few years. This article presents a review of the various types of equipment in use, how the units are operated, installed and controlled, and data on operating costs. Included is a list of electric heating equipment manufacturers, and the type units produced.

ELECTRIC heating, as it is known today, is perhaps ten years old, and its use before the end of World War II is negligible. Development of equipment is proceeding in two major directions: Through resistance heating, where heat is produced by the passage of electricity through wires or other electrically conductive material; and through the principle of heat exchange as embodied in the heat pump.

Resistance Heating

As the name implies, resistance heating depends upon the passage of electric current through a resistance to convert electrical energy to heat energy. This is then imparted to the space to be heated by some combination of conduction, convection and radiation. The conductive substance used as the heating element may be an insulated wire, an uninsulated coil, bare wire imbedded in glass or other substance, or a material specially prepared to conduct electricity such as glass or rubber.

Heat Pump

On the other hand, the heat pump extracts heat from a medium such as air, water or earth and transfers it to the space to be heated in a manner similar to the operation of the household refrigerator. When cooling is required, the process is reversed. The great majority of residential heat pumps in use today operate on the air-to-air principle, because that cycle is low in cost. Heat is extracted from the outside air and is transferred to the inside air.

The amount of heat energy supplied to the space to be heated by the heat pump is generally two or more times as great as the electrical energy required to drive the unit's motors, resulting in economy of operation. However the amount of heat energy available from the outside air in effect decreases as the outdoor temperature decreases. While units can be designed to provide sufficient heat at low outdoor temperatures, the efficiency would be relatively low, and the size of equipment required for heating would be considerably greater than that required for cooling. The unit would thus operate during the summer far below rated capacity. Consequently, units are generally designed closer to the summer cooling load, and an auxiliary resistance heater is incorporated which automatically is brought into use when the temperature drops below a certain level. Of course, the heat pump then becomes the equivalent of a resistance heater.

Systems

Resistance heating is employed either as a central system or (and most commonly) as individual units in each room. The central system may be in the form of a series of resistance heating elements located in a furnace plenum or in ductwork through which air is circulated. The elements heat the passing air in the duct. An air conditioning unit is often used in conjunction with this type of system, so that cooled air is distributed during the summer months through the same heating ducts.

In smaller homes, the central system may be a simple electric resistance floor furnace set into the floor in a central location.

Systems that provide individual room heating, employ wall panels, baseboard units, ceiling panels, or embedded cable in the ceiling or floor.

Wall Panels

Wall panels available for surface or recessed mounting, use natural convection or direct radiation to distribute the heated air. Actually, some radiation is involved with all types, and heaters designated as radiant heaters

Glass panel heaters installed beneath windows on outside wall of room.

Radiant heating cable, stapled to layer of gypsum board, is covered with mastic before application of finished ceiling surface.

also depend upon convection to varying degrees. In general, the proportion of direct radiation to natural convection is related to the nature and configuration of the heating elements and the dimensions of the heater, and it may vary with the specific application. Accurate laboratory measurements to determine this proportion are costly and difficult to make, and the precise figures are relatively unimportant.

Typical wall panels, depending chiefly upon natural convection, have one or more resistance elements mounted behind a decorative and protective grill, backed up by a polished reflector. Air heated by the elements rises and is displaced by cooler air from below, producing a continuous natural circulation. Air is also allowed to circulate between the reflector and the rear plate of the unit housing to prevent a buildup of heat.

Wall panel units with a high radiation output are characterized by large-area emitting surfaces. Several manufacturers use glass panels which are heated either by a filament type grid or an electrically conductive coating applied to the rear of the glass. Others in use include asbestos or ceramic panels having imbedded or sealed-in resistance wires.

Forced convection units are similar to those employing natural convection, with the addition of a small fan to expel the heated air into the room.

Most types of wall units are also available as portables for plug-in use.

Baseboard Units

Operating in the same manner as wall units, are the baseboard units. Heating is accomplished by a combination of direct radiation and natural convection. Units are installed on outer walls at the floor level and may usually be painted to match the decorating scheme of the room. Some manufacturers make models with different heat outputs for the same length heater, so that wall areas having greater heat losses may be more directly compensated for with high-output heaters. Baseboard units, usually no more than 8 to 10 inches high, are available in a variety of lengths with suitable spacers, and corner fittings, so that a continuous installation can be made to fit any length of wall. By spanning the entire wall length, the heaters are in the best position to counteract the downdraft which is characteristic of outside walls.

Ceiling Systems

Ceiling systems use radiation almost exclusively for heating, although convection currents are set up by re-radiation from heated objects combined with the movement of persons and opening of doors. The preponderance of ceiling systems in use today employ insulated resistance wires (single-conductor cable) embedded in the ceiling. In plastered ceilings, the cable is stapled to the lath in a continuous pattern over the entire ceiling area, with the plaster applied directly over the cable. In dry wall construction, two layers of ceiling gypsum board are used. The heating cable is stapled to the underside of the first layer, a mastic is troweled over the entire area, and a second layer of gypsum board is nailed up to form the finished ceiling. When electric current is passed through the cable, the entire ceiling becomes a panel radiating heat to the room below.

Heating cable is also, though much less frequently, imbedded in the floor. A concrete installation consists of wooden sleepers on the subfloor, to which the cable is fastened, plus a finish coat of concrete to cover the cable. Some manufacturers make two or more types of cable, varying the insulation to suit the application—dry wall, plaster or concrete. Others provide a single insulation which is suitable for all applications. Heating cable is available in various lengths and wattage ratings and must be obtained and installed in ratings nearest to those required for the job. The cable cannot be shortened or spliced.

The National Electrical Code does not permit heating cable to be imbedded in walls.

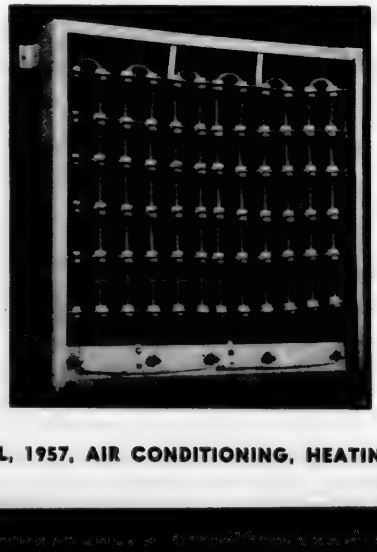
Another system of ceiling heating is in the form of

TABLE I—RECOMMENDED INSULATION*

Insulation should be installed to reduce the heat loss to the values given.

Construction	Watts per Sq Ft per Deg F
In ceilings without ceiling heating systems	.021
In ceilings with ceiling heating system ..	.014
In outside walls	.020
Under floors	.023

*Electric House Heating Section, NEMA



Typical duct heater consists of coiled resistance wire mounted in frame.

large area rubber panels only 1/16 in. thick. A thin sheet of electrically conductive rubber is sandwiched between sheets of insulating papers and is backed by sheets of aluminum foil. Current flowing through the rubber layer, between metallic strips on two edges, produces a uniform heat across the surface of the panel which is transmitted by radiation to the room below. Panels are applied to the ceiling with an adhesive and may be painted to match the room.

Glass panel heaters are also available for ceiling mounting, and a variety of infrared ceiling fixtures are made for bathroom use—in some cases combined with the lighting fixture.

Installation

All available types of electric heaters made by reputable manufacturers will do a good heating job when installed properly. A choice of one system over the others may depend on several factors: Initial costs, personal preference of contractor, builder or architect, availability of equipment, wall or ceiling space available, local codes and ordinances, building materials used for the house.

Resistance heaters require no special wiring techniques. Wall panels and baseboard units are equipped with a wiring box to which the line conductors are brought inside the wall, in the same manner as wall receptacles are wired. Panels are usually available with or without a built-in thermostat. If the thermostat is not included, an external thermostat is used, and conductors from the heater are routed first to the thermostat, then to the distribution panel.

Ceiling cable is installed in one continuous length in any one room. The pattern to be followed is planned beforehand, and the correct length and rating are selected accordingly. Both ends of the cable terminate at the same place on the ceiling above the spot where the thermostat is to be located. Non-heating leads attached to the cable during manufacture are then brought down inside the wall to the thermostat, where they are spliced to the circuit going to the panelboard.

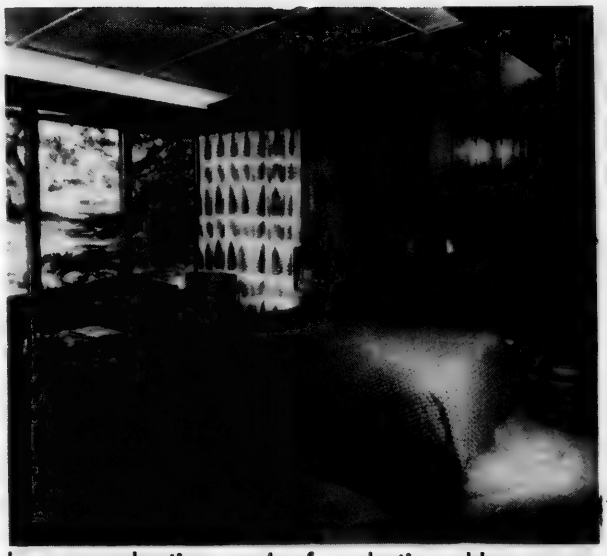
Insulation

One of the most important factors contributing to the comfort and efficiency of an electric heating system is the thermal insulation applied in the walls, ceiling and floors of the heated structure. Electricity is a premium, 100%-efficiency source of energy; therefore greater precautions should be taken to curtail its rate of loss.

The Electric House Heating Section of NEMA (National Electrical Manufacturers Association) has published an electric heating manual to serve as a guide to the industry in which are listed heat loss factors for walls, ceilings and floors which should not be exceeded. See Table 1. Values are kept below these limits by proper application of a sufficient amount of insulation.

For frame structures, this usually amounts to practically filling the stud space with 3 in. batts or blankets, filling the 6 in. joist space of the ceiling with loose fill insulation, and adding 2 in. batts or blankets between floor joists. Multiple-air-space reflective insulation, which is most effective when used to block the downward flow of heat, is often used as an alternative in the floor.

Heating equipment manufacturers are well aware that the reputation of electric heating, in general, and their products in particular, can suffer because of excess operating costs due to the omission or improper application of insulation. Accordingly, manufacturers invariably recommend full insulation. Contractors and installers, also affected by the performance of the systems they put in, are beginning to realize the wisdom of policing and follow-up to make sure recommendations are followed. Too many jobs have been estimated, assuming full insulation, only to fall short of expectations because floor insulation was omitted or ceiling or wall insulation was reduced to cut costs.



Large area heating panels of conductive rubber are applied to ceiling with adhesive and become part of the room decoration.

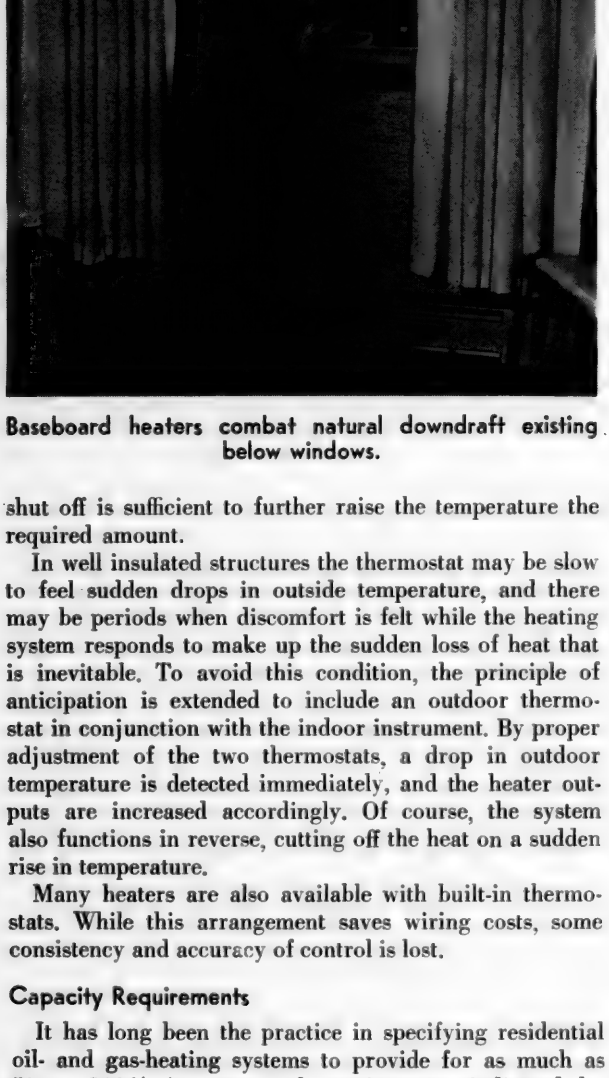
Control

A big advantage that electric heating enjoys is the facility with which it may be controlled. By the simple addition of a thermostat in each circuit, the heat in any room may be kept at any desired level, entirely independent of that in any other room. Efficiency and comfort, however, can easily be sacrificed by using an undependable thermostat. A good instrument should be capable of being set accurately and should operate consistently to keep the room within ½ degree of the setting. Close control between narrow temperature limits is desirable to avoid alternately warm and cool sensations which prompt frequent manipulation of the thermostat by the occupant.

Both line-voltage and low-voltage thermostats are used for electric heating. Greater precision can be built into the low-voltage instrument since current-carrying requirements are not so great; however, accurate line-voltage thermostats are available which are entirely satisfactory.

Timing devices are frequently employed to set back the thermostat to a lower temperature during the night while the occupants are asleep or absent. However, considerable difference of opinion exists as to any economic advantage obtained through night set-back in residences.

The principle of anticipation employed in thermostat manufacture helps to prevent overshooting of the control point. A small resistance heater in the thermostat causes the contacts to open slightly before the control temperature is reached, shutting off the heater. The small amount of residual heat given off by the room heater after it is



Baseboard heaters combat natural downdraft existing below windows.

shut off is sufficient to further raise the temperature the required amount.

In well insulated structures the thermostat may be slow to feel sudden drops in outside temperature, and there may be periods when discomfort is felt while the heating system responds to make up the sudden loss of heat that is inevitable. To avoid this condition, the principle of anticipation is extended to include an outdoor thermostat in conjunction with the indoor instrument. By proper adjustment of the two thermostats, a drop in outdoor temperature is detected immediately, and the heater outputs are increased accordingly. Of course, the system also functions in reverse, cutting off the heat on a sudden rise in temperature.

Many heaters are also available with built-in thermostats. While this arrangement saves wiring costs, some consistency and accuracy of control is lost.

Capacity Requirements

It has long been the practice in specifying residential oil- and gas-heating systems to provide for as much as 50 to 100% in excess of requirements indicated by calculated heat loss. Electric heating systems, however, are designed as closely as possible to agree with heat loss calculations. There are two principal reasons:

1. From the electric utility standpoint, economical service depends upon a high diversity of operation during peak periods; it is desirable that the fewest possible heating units be connected to the utility's lines at any one instant during these periods. (Diversity cannot be directly controlled by the utility; it is inherent in the habits of the customer and a characteristic of the individual residential control systems.) Where a unit is installed with 20% more capacity than is likely to be needed, that extra 20% is energized every time the thermostat calls for heat and this adds to the utility's peak. Where a demand charge is included in the customer's bill, the customer is likely to pay extra for the 20% added capacity.
2. Good thermostats are manufactured to provide accuracy of control (operation within close temperature limits) at a relatively rapid cycling rate of three or four on-off periods per hour, at the lowest possible cost to the consumer. Instruments intended for electric heating are designed for and tested on actual heating equipment which is correctly installed. To either intentionally or through ignorance oversize the heating equipment is to change the conditions under which the thermostat must operate—at a reduction in efficiency and effectiveness of control.

Heat loss calculations for electric heating installations are identical to those made for any other type of system, using recognized thermal coefficients and infiltration factors. To determine the heater rating required for a particular room, the total calculated heat loss in Btu per hour is converted to watts by the simple relation 1 watt = 3.413 Btu per hour. Watts, therefore, are obtained by dividing Btu per hour by 3.413. The heater having the closest available rating is installed.

Since much electric heating is being installed by electrical contractors, it has become common practice to calculate heat loss entirely in electrical terms. Heat loss coefficients for various building materials are tabulated in watts per square foot per degree temperature difference rather than in Btu per hour per square foot per degree temperature difference. This eliminates the necessity for the electrical man to think in terms of Btu, an unfamiliar quantity. It is, of course, strictly a matter of choice, since both methods yield entirely the same results.

Some rules of thumb are used—so many watts per square foot or so many watts per cubic foot. For similar installations and structures in the same geographical area, they may prove quite accurate. However, they can also be very wrong. A detailed analysis of the building using standard heat loss calculations is recommended.

Electric Utilities

Electricity cannot be stored until it is needed. Therefore, the utility must be capable of generating the maximum amount likely to be required at any given time. There are peak periods of the day and of the year when a high percentage of the customers use electricity at the same time. When the highest of these peaks approaches, equals or exceeds the maximum generating capacity of the utility, it must either invest in new equipment to increase its capacity or avoid encouraging additional heavy uses of electricity which would add noticeably to the existing peak. New operating and distribution equip-

TABLE 2—ESTIMATING ANNUAL ENERGY CONSUMPTION

Formula for determining annual energy requirements for complete electric house heating:*

$$\text{Annual kwh} = \frac{HL \times DD \times 18.5}{TD}$$

HL = total heat loss (kw), including thermal loss through building materials and infiltration.

DD = average annual degree-days.

TD = design temperature difference, deg F, (difference between the desired indoor temperature and the outside design temperature for the locality).

*Electric House Heating Section, NEMA

ment added to serve peak loads brought about by electric heating, would remain idle during the non-heating season, accompanied by an excessive dollar charge for interest, taxes and depreciation on the equipment.

The air conditioning boom is causing many utilities to change their thinking. Whereas in the past most companies were called upon to furnish their maximum power during peak periods in the winter, extensive air conditioning loads are causing the peaks to occur during the summer. Thus plant equipment is beginning to lie idle during winter months. It is estimated that by 1965 utilities in 30 states serving 71% of the nation's total electrical load will be faced with such a summer peak. Electric heating is the only forseeable load which can come anywhere near offsetting this peak. Each utility has its unique problems; no blanket policy or solution can be said to apply to them all.

Economic Factors

While just about half the present electric heating installations are in the TVA area where electric power rates are low, the increasing acceptance of electric heat in other parts of the country at higher rates indicates that comfort and convenience are also strong factors influencing its choice.

It is the province of the manufacturer, utility, engineer or contractor to estimate the annual cost of operation for prospective users of electric heat. While consistently low estimates by the manufacturer or utility could intially sell more heaters or add more heating load, the first few heating bills in a bad winter would soon break the bubble and have the opposite effect on customer acceptance. Therefore, every effort is made to study past experience and available operating records to arrive at reliable estimating methods.

Theoretically, using the well known degree-day concept, the annual kilowatt-hour consumption should be given by the formula

$$\text{Annual kwh} = \frac{\text{heat loss (kw)} \times \text{degree days} \times 24 \text{ hrs per day}}{\text{design temperature difference} \times \text{efficiency}}$$

Since all electricity used is converted to heat, the efficiency should be 100%. But all experience points to annual consumption much less than that given by this formula, which would indicate efficiencies far in excess of 100%.

Factors responsible for this deviation include external sources of heat which satisfy part of the requirements—such as cooking appliances, body heat from the occupants, and solar heat gain. Rather than attempt to introduce the concept of efficiencies greater than 100%, the factor "24 hrs per day" is treated as a constant less than 24 to more nearly match actual operating experience.

Data accumulated from various parts of the country show values of this constant in use varying from 12 to 24, depending upon location, type of building and type of heating system installed.

To serve as a guide, members of NEMA's Electric House Heating Section (all electric heater manufacturers) have agreed on 18.5 as representing an average value for the constant discussed, which should give close estimates in most cases. It is perhaps well to start with this constant. Then, if experience shows it to be high or low, it can be modified accordingly. The formula is given in Table 2.

TABLE 3—COST TO HEAT HOUSES BY ELECTRICITY

City	Cent Rate per Kwh	Avg. Cost per Sq Ft, Cents	Degree-days	Cost per Sq Ft Per Cent Rate
Atlanta, Ga.	1.75	12-14	2811	6.86-8.00
Cleveland, O. ..	1.6	16	5717	10

Care must be exercised in applying the degree-day method of estimating in areas of low degree-days. The mean daily temperature, from which degree-days are calculated, may not be an accurate indication of the average temperature through most of the day.

Once the annual energy requirements are determined, the operating cost is simply a matter of multiplying the kilowatt-hours by the cost per kilowatt-hour. Since most electric utilities sell energy at decreasing rates as consumption increases, an average rate must be used for estimating. It usually is equal to or slightly above the lowest step in the rate structure.

Actual energy rates offered by utilities to electric heating customers vary from less than one cent per kwh upward. Many utilities desiring an electric heating load find that profitable operation can be accomplished around 1½ or 1¾ cents per kwh. Consumers desiring electric heat decide whether the advantages and comfort inherent in its use are in line with the operating costs as indicated by the local electrical rate. There is no one rate which may be designated as the limit over which electric heat may not be considered.

The economics of electric heat, as compared to a fuel-fired system from the consumer's standpoint, involves more than a comparison of annual operating costs. In new construction, costs ascribable to electric heat include additional electrical capacity and circuits, the cost of the heaters and controls, and extra insulation. If ceiling cable is used with dry-wall construction, the second layer of gypsum board should be charged to the heating system. Conventional fuel system costs include the heating equipment and controls, necessary ductwork and electrical circuits, fuel storage equipment and piping, registers, radiators or other room outlets, the chimney, and the connecting piping. Items common to both but in varying degrees are the maintenance of the equipment and the space occupied by the equipment. Initial costs must be projected throughout the life of the mortgage and interest charges added accordingly. A rigid analysis of these costs can yield a dollars-and-cents comparison of two systems under consideration.

From this point, items must be considered which are less easily measured but which are important to the homeowner. Absence of a central heating system may affect inclusion of a basement in the original design of the house. A spread-out floor plan need not be curtailed because of hard-to-heat rooms distant from the furnace; the problem doesn't exist with electric heat. Also, with an electric heating system, any number of extra rooms may later be added without affecting the existing heating equipment.

As to the question of what it will cost to heat a home,

that must be answered for each individual case. Examples from two different parts of the country, Table 3, may help to establish a relative idea of approximate costs.

The third column shows the average annual cost per square foot of heated floor area at the rate given in the second column. The cost for electrical energy as given in the second column was used in arriving at the average cost per square foot. The electric rate in each of the two cities is different. In order to bring the two cities on a comparative basis, a rate of one cent per kwh was assumed and figures worked, as given in the last column, for cost per square foot per one cent rate.

These figures are averages for fully insulated houses of standard construction; but again, variations in living habits, glass area, orientation of house, etc., may combine to produce substantial differences in cost.

Manufacturers

Following is a representative list of electric heating equipment manufacturers. Letters following each listing indicate which of the following types of heaters are made. Rated voltages vary: 115, 120, 208, 230 or 240 volts.

Code Letter	Heater Type	Wattages Available
A	Wall panels and units	600 to 4000
B	Baseboard units	100 to 375 (per ft)
C	Ceiling cable	200 to 5000
D	Ceiling panels and units	500 to 10,000
E	Duct heaters	290 to 300,000
F	Floor furnaces	3000 to 8000
G	Steam radiators	1000 to 3000

Acme Electric Heating Co., 1217 Washington St., Boston 18, Mass. (A, B)
Berko Electric Mfg. Corp., 212-40 Jamaica Ave., Queens Village 28, N. Y. (A)
Burnham Corp., Box 351, Zanesville, Ohio (G)
Can Arm Corp., P.O. Box 30, Chazy, N. Y. (A, B, D, G)
Cavalier Corp., Electric Heating Div., 343 W. First St., Chattanooga, Tenn. (A, B, F)
Ceilheat, Inc., 5212 Homberg Drive, Knoxville, Tenn. (A, C)
Continental Radiant Glass Heating Corp., 1 E. 35 St., New York 16, N. Y. (A, B)
Crystalheat Co., P.O. Box 2275, Van Nuys, Calif. (A, B)
Dixie Raydiant Electric Heat Corp., 66 Eleventh St. N.E., Atlanta 9, Ga. (A, C, D)
Electrend Products Corp., St. Joseph 2, Mich. (A)
Electriglas Corp., Newbridge & Windsor Rds., Bergenfield, N. J. (B, D)
Electriliving Corp., 4913 College Ave., Indianapolis 5, Ind. (B)
Electro-Products Mfg. Co., 8310 N.E. Highway 99, Vancouver, Wash. (B)
Electromode Div., Commercial Controls Corp., 45 Crouch St., Rochester 3, N. Y. (A, B, C, E)
Electrovector, Inc., 475 Flushing Ave., Brooklyn 5, N. Y. (A, B)
Everwarm Inc., 3600 Pleasant Ridge Rd., Knoxville 16, Tenn. (A, C)
General Electric Co., Wiring Device Dept., 95 Hathaway St., Providence 7, R. I. (B, C)
Heatmore, Inc., 59 Throop Ave., Brooklyn 6, N. Y. (A, B)
Ilg Electric Ventilating Co., 2850 N. Pulaski Rd., Chicago 41, Ill. (D)
Industrial Engineering Equipment Co., 122 E. Fourth St., Davenport, Iowa (E)
Jackson Mfg. Co., Inc., W. L., 1222 E. 40 St., Chattanooga, Tenn. (F)
Koral Electric Mfg. Co., 43-22 Van Dam St., Long Island City 1, N. Y. (G)
LaSalle Products, Inc., 143 Seneca St., Buffalo 3, N. Y. (A, D)
Markel Electric Products, Inc., 145 Seneca St., Buffalo 3, N. Y. (A, D)
Martin Stamping & Stove Co., Electric Heater Div., Huntsville, Ala. (A, B, C, F)
Matthews Electric Heater Mfg. Co., Albertville, Ala. (A)
Meier Electric & Machine Co., Inc., 3525 E. Washington St., Indianapolis 7, Ind. (A, B, C)
Modernheat Cable Corp., P.O. Box 576, Kingsport, Tenn. (A, B, C)
NuTone, Inc., Madison & Red Banks Rds., Cincinnati 27, Ohio (D)
Pryne & Co., Inc., 140 N. Towne Ave., Pomona, Calif. (A, D)
Rentip, Inc., Route 4, Osborne Rd., Knoxville, Tenn. (C)
Roberson Co., L. N., 1539 E. 103 St., Seattle 5, Wash. (C)
Salton Mfg. Co., Inc., 29 Jumel Pl., New York 32, N. Y. (D)
Sundial Electric Co., 87-49 130th St., Richmond Hill 18, N. Y. (B)
Sunwarm, Inc., 2353 Ft. Henry Dr., Kingsport, Tenn. (A, C)
Tennessee Plastics, Inc., P.O. Box 786, Johnson City, Tenn. (A, C)
Thermador Electric Mfg. Co., 5119 District Blvd., Los Angeles 22, Calif. (A)
ThermoRay Corp., 26 Ave. B, Newark, N. J. (A)
Trade-Wind Motorfans, Inc., 7755 Paramount Blvd., Rivera, Calif. (A)
United States Rubber Co., Mechanical Goods Div., 1230 Avenue of the Americas, New York 20, N. Y. (D)
Vulcan Radiator Co., 775 Capitol Ave., Hartford 6, Conn. (B)
Waage Electric, Inc., 720 Colfax Ave., Kenilworth, N. J. (E)
Wesix Electric Heater Co., 390 First St., San Francisco 5, Calif. (A, E, F)
Westinghouse Electric Corp., 5815 Peladeau St., Emeryville 8, Calif. (A, B)
Wiegand Co., Edwin L., 7637 Thomas Blvd., Pittsburgh 8, Pa. (A, B, C, D, E)

Waste Disposal at Hanford Atomic Plant

Methods of disposal of radioactive wastes at the Hanford Atomic Products Operation were described in a paper by R. E. Tomlinson of the Chemical Processing Department, Hanford Atomic Products Operation, presented before the Fifth Annual Conference on Atomic Energy in Industry.

Low intensity wastes, such as process condensates, are allowed to percolate through the soil to the ground water. Radioactive ions such as cesium and strontium are retained in the soil by ion exchange. When the concentration of these ions in the ground water below a given disposal site approaches one-tenth of the maximum permissible concentration for drinking water, a new disposal site is brought into use. Liquid wastes containing small concentrations of hazardous ions, not adequately retained by ion exchange in the soil, may be stored in the soil by specific retention due to local conditions. Liquid so held by the soil will migrate slowly in all directions and will contaminate the water table very slowly, if at all.

The contamination of the atmosphere is also a point of continual concern. The ventilation exhaust from the chemical separation plants contains particles of dust, rust, and other particulate matter on which radioactive materials are potentially absorbed. These particles are removed from the air by filters of sand or fiber glass. The liberation of radioiodine to the atmosphere is controlled at a rate such that a hazardous concentration does not accumulate in living material in the environs. This approach is possible because the radioiodine decays losing half of its radioactivity every eight days. The radioactive noble gases are discharged at low concentration to the atmosphere.

In general, waste disposal practices at Hanford have been safe and economical during twelve years of operation.

CORROSION OF DUCTS AND HOODS IN EXHAUST SYSTEMS

Material Used in Hood or Duct	Chromic Acid Plating or Anodizing	Hydrochloric Acid	Hydrofluoric Acid	Nitric Acid	Oxalic Acid (Anodizing)	Sulphuric Acid	Acid Dipping and Pickling (Horizontal Ducts)	Alkaline Cleaner	Alkaline Cleaning Solutions[2]
Galvanized steel	E — P	F — P	P	P	—	P	—	E — P	E
Black iron	E — P	P	—	—	—	P	—	E — P	E
Stainless steel	S	E	—	E	—	S[5]	—	E	E
Monel	—	S	S	—	E	—	—	—	—
Lead lining	E — S	F	—	E	S	E[6]	—	—	—
Aluminum	—	—	—	—	E	—	—	—	—
Hard rubber	—	E	—	—	—	E	—	—	—
Natural rubber	—	E[4]	S	—	—	E[7]	—	—	—
Pressed wood	S — P	—	—	—	—	P	—	S	—
Neoprene	S	E	—	E	—	E	—	E	E
Terne plate	S	F	—	—	—	S	—	—	—
Buna S	—	E	—	—	—	—	—	—	—
Koroseal	—	E	—	—	—	—	—	—	—
Asphalt paint on steel, galv. or black	P	E — F	S	F — P	S	E — P	P	E — S	E
Asphalt, hot, 180–200 deg., on galv. steel	—	S	—	F	—	S	F	—	—
Asphalt, 3-course felted, on metal or wood	—	—	—	—	—	F	E	—	—
Asphalt, on painted pressed wood	—	S	—	—	—	—	—	S	—
Phenolic resin paint	S — F	—	—	—	—	F	—	—	—
Phenolic resin, bonded plywood or redwood	P	F	—	—	—	E — S	—	—	—
Phenolic resin, baked or solid cast resin	E — F	E — P	E	F	—	E	—	S	—
Asbestos cement, board or tube	—	F	—	—	—	E[5]	—	E	—
Vinylite resin type paint	—	E[4]	—	S	—	E — P	—	—	—

The accompanying table shows the relative performance of materials used in exhaust ducts and hoods with respect to their resistance to corrosion when used in common industrial applications. The

Material Used in Hood or Duct	Alkaline Plating (Copper, Cadmium, Silver)	Plating and Anodizing (Horizontal Ducts)	Bright Nickel Plating	Plating and Dipping (Vertical Ducts)	Tanning, Dressing, Dyeing, Bleaching Solutions	Boiling Water and Steam	Decarbonizing Agents[3]	Degreasing Compounds (Organic and Mineral Solutions)	Enamels and Lacquers (Coating and Dipping)
Galvanized steel	E — P	—	S — P	P	S[8]	E — P	E	E	E
Black iron	E — P	—	S — P	—	—	S — P	—	E	S
Stainless steel[7]	—	—	—	—	—	E	—	—	—
Monel	—	—	—	—	—	E	—	—	—
Natural rubber	—	—	—	—	S[1]	—	—	—	—
Pressed wood	E	—	—	—	—	—	—	—	—
Neoprene	S	—	S	—	—	E	—	—	—
Asphalt, paint on steel, galv. or black	E — S	P	E	F	—	E — S	—	—	—
Asphalt, hot, 180–200 deg., on galv. steel	—	S	—	—	—	E	—	—	—
Asphalt, 3-course felted, on metal or wood	—	E	—	—	—	—	—	—	—
Asphalt on painted pressed wood	S	—	S	—	—	—	—	—	—
Phenolic resin, bonded plywood or redwood	—	—	—	E	—	—	—	—	—
Phenolic resin, baked or solid cast resin	S	—	—	—	—	—	—	—	—
Asbestos cement, board or tube	S	—	—	—	—	E	—	—	—
Vinylite resin type paint	S	—	S	—	—	S	—	—	—

[1] Acid. [2] Mild soaps, detergents, water soluble oils, 140–180 deg. F. [3] Creosote oil, kerosene, ethylene dichloride. [4] To 20%. S for 50–70%, 150 deg. [5] To 50%. 20% anodizing, agitated, 80 deg., S. [6] To 50% plating. Over 50%, pickling, 20% anodizing, E. [7] 5–22%, 135–215 deg. pickling. Plating, pickling, anodizing, E. [8] Except acid.

table is presented through the courtesy of The Division of Industrial Hygiene, New York State Department of Labor.

Ratings are based upon collated field service reports. Indefinite ratings are given where reports are inconsistent due to varying operating conditions (such as dilution, exposure to weather). Blank spaces denote insufficient information, not poor service.

Letters are used in the tables to indicate the approximate service life of the various listed materials, the key to these letter symbols being as follows:

Letter Symbol and Definition	Approximate Service Life
E — Excellent	Over 5 years
S — Satisfactory	2 to 5 years
F — Fair	6 months to 2 years
P — Poor	6 months
Combinations (E–P)	Indefinite rating

Steam Transmission Tunnel

Cuts Both Construction and Regular Maintenance Costs

R. HANKINS

Steam lines and condensate return lines were run underground through a large diameter concrete pipe duct tunnel from a new boiler house to serve an existing building. This resulted in considerable savings.

INCREASED demand for steam service at the Schenectady County Tuberculosis Hospital, Schenectady, N. Y. led to a study into the capabilities of the existing steam plant.

It was found that the plant did not possess (1) the required extra steam capacity, (2) the plant was in poor condition after long use and (3) replacement was necessary.

The possibility of merely replacing the boilers, using the original site, was rejected because:

1. An excess of noxious fumes close by the hospital was objectionable for health considerations.
2. Any prolonged interruption in steam service could not be tolerated.
3. Space was lacking for any additional equipment. A proposal for a new structure to house the larger boilers immediately adjacent to the existing building was rejected due to certain local obstructions in the area.

Eventually, a plan was evolved for a new boiler house, located away from the hospital buildings. To avoid detracting from the architectural scheme of the hospital and surrounding grounds, the new boiler house was located some 530 ft from the hospital behind a grove of trees. The boiler house is not visible either from the hospital grounds or from the highway running past the hospital.

Comparison of Designs

Several designs were considered for the method of steam and condensate returns transmission between the hospital and the new boiler house, as follows:

Overhead. This method would provide the least expensive solution. Piping would run above grade on hangers spaced at intervals. Maintenance would be the least difficult. These advantages are offset by the fact that this piping would have to run over roads (requiring a sizable clearance), would be unsightly on the grounds, and would be subject to the hazards of severe weather conditions.

Underground. A number of possibilities presented themselves here. The first is either patent tile duct or a presealed type duct construction. Construction advantage is that it is the least expensive method underground. However, the maintenance problem becomes critical as extensive excavation is necessary for any repair work, even though of a minor nature.

An alternative plan was a poured reinforced concrete tunnel. The advantage of simple maintenance was ruled out by project cost.

The last plan considered was a tunnel constructed of standard concrete pipe duct. This had the advantage of moderate cost with the necessary accessibility for easy piping maintenance.

The hospital board of directors, after due consideration, selected the concrete pipe duct type construction for the proposed tunnel.

A complete design for the proposed project, utilizing concrete pipe duct for the tunnel was submitted by J. L. Ottenheimer, consulting engineer, Albany, N. Y., and it was accepted.

Tunnel Construction

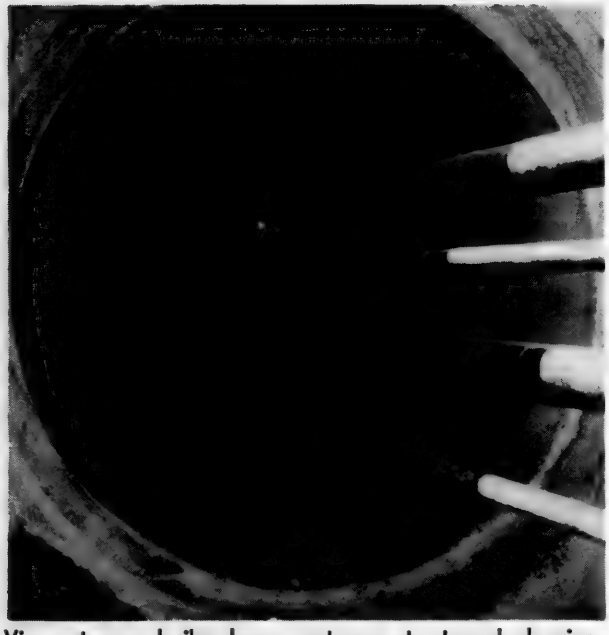
Originating at the hospital foundation wall, the tunnel makes a 90 deg bend to avoid local obstructions on the site. It then has a 530 ft. run to the new boiler house, including a 25 deg bend adjacent to the new boiler house wall. The tunnel is pitched throughout its length from the hospital down to the new boiler house at an average rate of ½ in. per running foot.

The duct consists of 5 ft. lengths of standard 66 in. dia concrete culvert pipe laid to the proper pitch and sealed with grout at the over-lapping ends.

Special construction was required at the two steam pipe loop points and the three tunnel anchor points. At the expansion loop points, a 10 ft x 12 ft x 12 in. thick concrete enclosure was constructed with precast concrete plank roof beams.

Three lengths of standard concrete culvert pipe laid

One of two expansion joint spaces shown uncovered. Note the access manhole and expansion loop in piping.



View at new boiler house entrance to tunnel showing expanding ring roller supports and channel uprights.

at right angles to the main duct accommodate the steam pipe loop at these points. The loop duct is sealed at its end with a 12 in. thick poured concrete plug. Each expansion loop space is provided with a manhole for access to the space. Manholes are constructed of standard 24 in. dia concrete culvert pipe cut and pitched into the larger duct below.

At each tunnel anchor point is a 12 in. thick poured concrete collar-encased structural steel member to use as a pipe anchor. Adjacent to each anchor point is a 24 in. dia manhole similar to those located at the expansion loop spaces.

Pipe supports in the tunnel, at 15 ft intervals, are made up of a 1 in. x 4 in. inside expanding ring with vertical channel members to support multiple pipe rollers. At present, the piping in the tunnel consists of two 5 in. steam supply and two 2 in. pumped condensate return lines. Space exists for future additions such as electric or compressed air service lines.

Although this operation has been in use for one year, no difficulties were experienced by the operating personnel and no evidence of settling was noted at any point.

The standard concrete culvert pipe selection was fully justified on the basis of costs, ease of maintenance, and the adequacy of service provided.

Kilby and Sons of Albany, N. Y. were general construction contractors and J. T. McConville of Schenectady, N. Y. was the mechanical contractor for the entire project. Johns Manville Co. were insulation subcontractors.

Utilization of Natural Heat from Hot Springs in Iceland

An overall picture of the utilization of natural heat in Iceland, as it is obtained from hot springs and heat reservoirs, was presented by Gunnar Bodvarsson in a paper on Natural Heat in Iceland before the Fifth World Power Conference.

The most important utilization of natural heat in Iceland, so far, is for domestic and green-house heating. The city of Reykjavik, the capital of the country, having a total population of 62,000, has a central heating system utilizing natural hot water which serves a total of 32,000 inhabitants and most of the downtown industrial and office buildings.

The Reykjavik hot water supply system pipes the hot water over a distance of 16 km (9.9 miles) from a number of wells in a thermal area northeast of the city. The average temperature of the water at the wells is 87 deg C and the temperature drop in the main pipe line about 3 deg, that is, the water reaches the city at a temperature of some 84 deg. The total piping system in the city has a length of some 70 km and serves about 3000 houses. The average temperature of the water at the houses is about 75 deg. This water is pumped through the radiators and wasted at a temperature of 35 to 45 deg, depending on the load.

It is now planned to extend the system to the whole city, and it is believed that the natural heat resources in the neighborhood of the city will be able to furnish heat enough to heat the houses for a population of up to 150,000 and sources farther away may increase this figure considerably. The needs of Reykjavik will thus be taken care of for a long time to come.

Besides Reykjavik, four small communities having a population of some 1000 inhabitants each, have similar central heating systems. Altogether, about 40,000 people in Iceland live in houses heated by natural hot water.

A considerable amount of greenhouses are heated by the means of hot water and also about 80 swimming pools. The latter have a very remarkable influence on sport activities in Iceland.

A remarkable fact concerning the natural steam fields is not only the great area of hot ground but also the great volume of hot rock under these areas. Measurement of borehole-temperature in some of the steam fields in Iceland has revealed temperatures up to 230 deg at the mere depth of 220 meters, and higher values can be expected at greater depth. Under the major steam fields in Iceland there are considerable cubic kilometers of rock heated to elevated temperature by the upflow of high-temperature water from below.

The utilization of natural steam for power generation has been much discussed in Iceland, but the abundance of hydropower has so far restricted the possibilities in this field. The price of power from natural steam plants will, in general, be on a similar level as that from the present hydro-power plants, so there is, at present, not enough advantage in going into the erection of natural steam plants, especially as it must be kept in mind that the natural steam plants always will be less reliable than the hydro-power plants. There is a possibility that this situation may change somewhat in the near future, but this depends on the atomic developments which may again change the whole picture.

Calculating the Heat Requirements of a Snow Melting System

Part 8 — Northeast Central Region

WILLIAM P. CHAPMAN

This is the eighth article of a series which will eventually cover all parts of the U.S. where snow melting systems are likely to be used. The first article summarized the basic equation for heat required for snow melting and defined the free area ratio as the ratio of slab area free of snow to total slab area. In order that each installment of this series can be understood, the classification of systems and explanation of the four tables are repeated.

THE total heat output of a snow melting system depends on the rate at which it melts the snow, and this rate in turn depends on the relative importance of rapid snow removal among the different types of applications. Snow melting systems can be classified as follows:

Class I (minimum): Residential walks or driveways and interplant areaways;

Class II (moderate): Commercial (stores and offices) sidewalks and driveways and steps of hospitals; and

Class III (maximum): Toll plazas of highways and bridges, and aprons and loading areas of airports.

These classifications depend upon the allowable rate of snow melting. For example, a residential system does not have to melt snow as rapidly as a commercial system. In fact, a depth of snow of an inch for an hour or so during a heavy storm might not be objectionable with a residential system. On the other hand, a store manager would claim the system was inadequate if half an inch accumulated on the sidewalk in front of his store. The difference, then, between a Class I system and a Class II system is in the ability of each system to melt snow. The one feature that is common to all classes is that the systems must be adequate for some combination of weather factors. Or, the designer wants to be able to say that he will pay to melt snow whenever conditions are milder than some critical value but he is willing to have an inadequate system for a given fraction of the time. In other words, the designer will run a calculated risk providing he knows the odds of that risk. For a residential system, where initial cost must be at a minimum, the designer must accept more frequent snow accumulations.

Naturally, the owner is not concerned about an explanation of why there is an accumulation of snow on the sidewalk. It is immaterial whether the accumulation is due to excessive snowfall or whether it is due to

an extremely cold snowfall. In both cases, the ultimate reason is that an inadequate flow of heat is reaching the surface. The true analysis of heat output, then, depends on an analysis of the weather. This is true of all three system classes.

The total heat requirements of a snow melting system are determined, therefore, by (a) the total area of the snow melting slab, (b) the rate at which the snow is to be removed, and (c) the values and frequency distribution of each of the pertinent climatic variables (humidity, wind, temperature, and snowfall). Obviously (c) varies from city to city and, due to the complexity and number of calculations to obtain a frequency distribution of the four variables, the evaluation of (c) has been virtually impossible. However, by the use of punched cards and statistical tabulating machines, data have been derived so that the heat requirements for a given city can be simply presented.

The designer needs two types of information. First, the most severe combinations of variables on which to base his *design output*, and second, the heat required over the season so that *operating costs* can be determined. These data are given in Tables 1, 2, 3, and 4 which follow and which cover three cities in the Northeast Central region of the U. S.

Table 1

The first table gives some generalized information on snowfall and snow on the ground. The next to last item, "Greatest depth of snow on the ground" indicates the greatest depth to which snowfall has ever accumulated. Other items are self-explanatory.

Table 2

Table 2 contains the operating information of a snow melting system. For freezing temperatures (32 deg and below) but no snowfall the system may be "idling." That is, the designer may want to supply some heat to the slab so that there will be immediate melting when snow starts to fall. The column on mean temperature gives the average temperature during *freezing* temperatures. This temperature is used in calculating the "idling" load. The other term needed to calculate idling load is the wind velocity during the period of freezing temperatures.

TABLE 1—GENERAL INFORMATION ON SNOWFALL, NORTHEAST CENTRAL REGION

Item	Duluth, Minn.	Sault Ste. Marie, Mich.	Minneapolis-St. Paul, Minn.
Approximate mean number of days with an inch or more of snow on the ground ...	140	130	110
Average number of inches of snowfall per year	54.9	83.5	42.2
Great snowfall in 24 hours, inches	23.0	14.3	16.2
Greatest depth of snow on the ground, inches	38.6	36.2	31.0
Mean number of days per year with snowfall of 1 inch or more	16	29 (102 with trace or more)	12

The column "Hours of Snowfall" indicates the number of hours that snow is falling at rates equal to or greater than 0.01 inch of water equivalent per hour. Roughly speaking there are snowfalls of "trace" quantities about twice as often as there are for measurable quantities of 0.01 inch or more. It is assumed that these light falls can be handled by the idling load.

The remaining columns of Table 2 represent the frequency distribution of required heat output. This distribution is based on the solution to the basic equation for two values of the free area ratio A_r. This distribution represents the heart of the analysis and is also the basis for Tables 3 and 4.

Table 3

Table 3 contains the *design* heat requirement—as explained in the footnotes to Table 3. These design rates may be altered by the designer if he feels that a particular job should have a different design criterion from those given in the footnote. Any change in design selection should be based on the frequency distribution given in Table 2.

Table 4

Table 4 contains the data required to estimate the operating cost of a snow melting system. The footnotes to Table 4 explain the various items.

Use of the Tables

Example: You are a plant engineer for a company located just outside Duluth, Minnesota. You have decided that a snow melting system would increase plant shipments during the winter. You have two choices. Run a pipe line from a remote station or put in a boiler just for the snow melting system. The water from the remote station is being wasted at the present time. If you use it as a heat source for a snow melting system, you can reclaim the energy that is being wasted now. Your choice is governed by the economics of each system. If you run the pipe line you will have an almost unlimited source of good, non-corrosive hot water that will develop a temperature of 160 deg F in the anti-freeze fluid of your snow melting system.

The problem is to compare the cost of the pipe line (including maintenance of course) to the cost of the boiler and the annual fuel consumption. In one case you have high initial cost but low operating costs; in the other case you have just the opposite. First, you must decide on the performance of a system operating with 160 deg fluid, and second you must decide on the annual operating cost of such a system.

Solution: A system with a fluid temperature of 160 deg and a surface temperature of 33 deg should have an output of

$$q = \frac{t_w - t_f}{R} = \frac{160 - 33}{0.50} = 254 \text{ Btu per (hour) (sq.ft.)}$$†

Assume an output of 250 Btu per (hour) (sq.ft.). From Table 2, for Duluth, you see that 2.5 + 1.7 + 0.6 = 4.8% of the snowfalls will require an output in excess of 250 for $A_r = 1.0$. On the other hand the maximum output for $A_r = 0$ is shown as 206 Btu per (hour) (sq.

† See "Design of Snow Melting Systems," W. P. Chapman, *Heating and Ventilating*, April, 1952

TABLE 2—DATA FOR DETERMINING OPERATING CHARACTERISTICS OF SNOW MELTING SYSTEMS IN THE NORTHEAST CENTRAL REGION[1]

Period of No Snowfall

City	Air Temperature, Deg. F[2]		Wind Velocity, Freezing Period,[6] mph
	Per-cent of Winter Hours with No Snow at Above Temperatures		
	Over 32	Below or Equal to 32	Mean Temperature During Freezing Period[6]
Duluth, Minn.	12.6	80.5	14.5	12.0
Sault Ste Marie, Mich.	21.3	69.2	18.6	9.4
Minneapolis-St. Paul, Minn	23.6	70.8	16.9	11.1

Period of Snowfall[3]

City	Hours of Snowfall[3]		Free Area Ratio, A_r	Required Output, Btu per Sq. Ft. per Hr.[4]									Maximum Output, Btu per Sq. Ft. per Hr.
	Per-cent	Hr. per Year		0–49	50–99	100–149	150–199	200–249	250–299	300–349	350–399	400–up	
				Frequency Distribution of Snowfall Hours at Above Outputs, Per-cent[5]									
Duluth, Minn.	6.9	250	1	23.7	32.9	20.6	13.7	4.3	2.5	1.7	0.6	—	382
			0	94.8	4.7	0.0	0.3	0.2	—	—	—	—	206
Sault Ste Marie, Mich.	9.5	345	1	45.7	32.8	14.3	5.7	1.4	0.1	—	—	—	262
			0	97.9	2.0	0.1	—	—	—	—	—	—	144
Minneap.-St. Paul, Minn.	5.6	203	1	28.4	31.4	21.7	14.1	3.5	0.6	0.3	—	—	313
			0	96.5	3.1	0.3	0.1	—	—	—	—	—	155

[1] The period covered by this table is from Nov. 1 to March 31, incl., with February taken as a 28¼ day month. Total hours in period = 3630.
[2] The percentage in Columns 2 and 3 plus the percent under hours of snowfall total 100%. Note that "Hours of Snowfall" does not include idling time, and is not actual operating time. See text.
[3] Snowfalls of trace amounts are not included; hence, "Hours of Snowfall" includes only those hours of 0.01 inches water equivalent per hour snowfall.
[4] Output does not include allowance for back or edge losses since these depend on slab construction.
[5] Percentages total 100% of the number of hours of snowfall.
[6] "Freezing Period" is that during No Snowfall when the air temperature is 32 deg or below.

ft.). In addition the maximum output for $A_r = 1$ is only 382; therefore, an output for 250 should develop a free area ratio of at least 0.25, but this is adequate for plant vehicular traffic, especially since you can expect $A_r = 1$ for 95% of the time.

It seems likely then that a fluid temperature of 160 deg will be satisfactory. The remaining problem is to compute the fuel consumption of a system such as this. You have decided to control the surface temperature at 33 deg and maintain $A_r = 1$ up to the capacity of the system. You can assume that the frequency distribution in each cell of Table 2 is linear, so that the system output for $A_r = 1$ up to $q = 250$ and $t_f = 33$ could be calculated as follows:

$$0.237 \times 25 = 59.25$$
$$0.329 \times 75 = 24.68$$
$$0.206 \times 125 = 25.75$$
$$0.137 \times 175 = 24.00$$
$$0.043 \times 225 = 9.68$$

143.36 Btu per (hour) (sq.ft.)

For the remaining 4.8% of the cases where the required output is in excess of 250 Btu per (hour) (sq.ft.) and $A_r < 1$, the system output could be calculated as: $0.048 \times 250 = 12.00$ Btu per (hour) (sq.ft.).

Since Duluth has an average snowfall of 250 hours per year, the annual system output would be:
$(143.36 + 12.00) \times 250 = 38{,}840$ Btu per (year) (sq. ft.)

TABLE 3—DESIGN DATA FOR SNOW MELTING SYSTEMS, NORTHEAST CENTRAL REGION

City	Design Output, Btu per (Hour) (Sq Ft)		
	Class I System[1]	Class II System[2]	Class III System[3]
Duluth, Minn.	83*	206	374
Sault Ste. Marie, Mich.	52*	144	213
Minneap.-St. Paul, Minn.	63*	155	254

To this figure must be added the estimated back and edge losses.

With these data and the fuel costs for a boiler you are in a position to compare the economics of the systems. One advantage of the remote system is that it can "idle" whenever there is no snow. The only cost is the pumping cost. With such an operation, the slab will be warm before the snow starts falling. In this way, there will never be an accumulation of snow.

[1] For Class I (residential) Systems, the design output is set at that required heat output (see Table 2) when $A_r = 0$ at the 98th percentile of the frequency distribution; that is, where 98% of the hours have this output or less.
[2] For Class II (commercial) Systems, the design output is the maximum output when $A_r = 0$ in Table 2 (last column).
[3] For Class III (industrial) Systems, the design output is determined by the following four requirements: (1) Output is never exceeded for two consecutive hours; (2) Output for $A_r = 1$; Table 2, is at least 1 Btu per hour per sq ft greater than maximum output for $A_r = 0$; (3) A_r is greater than or equal to 0.5 the maximum requirement shown in Table 2 for $A_r = 1$. That is, $q_d = q_s + q_m + 0.5\ (q_s + q_h)$ for the conditions where $q_t = q_s + q_m + q_h + q_s$ are a maximum; (4) The free area ratio A_r is unity for at least 98% of the hours listed in Table 2.
* See Table 4. Idling Rate is greater than Design Rate.

Northeast Central Region

The Northeast Central Region is generally considered as a "natural" snow melting market. Certainly, the winters are long and cold—at least in comparison with other U. S. cities. It is true, also, that the frequency of snowfall is quite high in this region. Fortunately, however, the required heat output for a snow melting system in this region is not so great as one would expect. Because of this fortuitous circumstance, snow melting can be justified easily on an economic basis.

The Northeast Central Region, as defined here, consists of the area between the United States-Canadian border on the north, and the Iowa-Wisconsin southern boundaries. The western edge follows the Missouri River, and the eastern edge follows the coast line of Lake Michigan. The three cities chosen to represent this area are Duluth, Minneapolis, and Sault Sainte Marie.

The Northeast Central Region is gently rolling with no natural barriers to prevent free movement of air masses. In the eastern half of the region the terrain is characterized by many lakes — it is marshy in northern Minnesota and Michigan. The Mississippi River splits the Region down the middle. The section to the west rises gradually from 800 feet at Minneapolis to about 900 feet at Fargo, N. D., then rises more sharply to 1700 feet at Bismarck, N. D. But this overall rise of about 900 feet is over an air line distance of some 400 miles. It is safe to say, therefore, that this region is quite flat and open.

Because of this flat, open terrain the region has a continental climate characterized by wide temperature variations. For example, in Minneapolis the lowest temperature ever recorded was —34 deg in January, 1936, and just six months later in July the temperature was 108 deg. A temperature of 106 was recorded in May, 1934, and a —27 deg has been recorded as late as March.

Normally, Minneapolis has 31 days per year with minimum temperatures below zero and 148 days below freezing. As a result, the average winter temperature is only 16 deg and daily mean temperatures are below freezing from mid-November to late March. This gives Minneapolis a chilly 7985 degree days per year. The snowfall (42.2 inches per year) remains on the ground on the average of 110 days per year. Strangely, though, on the average only 12 days per year have snowfalls of an inch or more. This is very low when cities such as Spokane, Detroit, and Hartford have that many days, and cities such as Caribou and Rapid City show 30 days or more. Notice, too, that the greatest fall in 24 hours was just 16.2 inches (in November, 1940). Even so, the frequency of snowfall is 203 hours per year with falls of 0.01 inch water equivalent. In other words, most of the snowfall is light and dry. This is corroborated by the frequency distribution in Table 2; 96.5% of the cases for $A_r = 0$ have less than 50 Btu per (hour) (sq.ft.) heat requirements. About once in five years a very heavy, wet snow can be expected.

Duluth is probably more representative of the northern and western parts of the Northeast Central Region. Duluth, like Minneapolis, is a twin city. Its twin is Superior, Wis. These two cities lie at the western tip of Lake Superior. Lake Superior affects the climate of Duluth in the fall, but by mid winter the effect is lessened considerably. One reason is that the prevailing wind is from the northwest during the winter and from the northeast during the eight months from March to October. Incidentally, these same northwest winds blow the polar air masses over Minneapolis.

The winter is longer and colder in Duluth than in Minneapolis. Lake Superior starts to freeze (in the harbors) about mid-November and remains frozen until mid-April. In the lake, the average date of significant ice formation is January, but the ice remains until mid-April. Such late ice formations delay the coming of spring and prolong the snow cover (140 days per year have snow on the ground). Trace amounts of snow are common in May, and there are an average of two days with falls of an inch or more in April. In April, 1950, the fall was 19.1 inches.

The average snowfall is 54.9 inches with a high of 92.9 inches in the winter 1950-51, and a low of 26.8 inches in 1899-1900 (the first year of full record). The

TABLE 4—YEARLY OPERATING DATA, NORTHEAST CENTRAL REGION

City	Idling			Melting		
	Time,[1] Hr. per Year	Rate,[2] Btu per (Hour) (Sq. Ft.)	Output,[3] Btu per (Year) (Sq. Ft.)	Time,[4] Hr. per Year	Class[5]	Output[6] Btu per (Year) (Sq. Ft.)
Duluth, Minn.	2922	113.8	332,000	250	I	33,200*
					II	38,100
					III	39,500
Sault Ste. Marie, Mich.	2512	77.7	195,000	345	I	17,600*
					II	22,200
					III	23,200
Minneapolis-St. Paul, Minn.	2570	95.1	244,000	203	I	14,200*
					II	17,600
					III	18,400

[1] From Table 2, Column 3 × 3630 (hr per year).
[2] Rate when idling, Btu per (Hr) (Sq Ft) = (0.27V + 3.3) (32 — t), where V = wind velocity from Column 5, Table 2, and t = air temperature from Column 4, Table 2.
[3] Product of the two preceding columns.
[4] Hours of Snowfall, from Column 7, Table 2.
[5] Based on the condition that surface temperature is maintained at 33 deg until required output exceeds design output, at which time design output is used regardless of required output. Distribution of required output based on Table 2.
[6] Based on Idling Rate rather than Design Rate.

most snow in any one month was 48.2 inches in March, 1917, and during December 5-6, 1950, 23.0 inches fell in 24 hours. As in the case of Minneapolis, relatively few days have heavy snowfalls. Only 16 days per year have falls in excess of one inch. Again this condition of frequent, light snowfall is illustrated by the frequency distribution given in Table 2; 94.8% of the cases for $A_r = 0$ have heat requirements below 50 Btu per (hour) (sq.ft.). About every other year a heavy, wet snow can be expected.

Duluth winters are quite long. The average monthly temperature falls below freezing in November (to 28.6 deg) and drops to 10.3 deg in January. It is April before the monthly temperature rises above freezing (it is 38.3 deg in April). The average degree days is 9669, but frequently it is above 10,000 (10,848 in the winter of 1911-12). On the average there are 41 days per year with minimum temperatures of zero or below, and 171 freezing or below. Just over a hundred days per year have maximum temperatures under freezing, but only two days get above 90 deg—generally in July and August —although it was 106 deg in July, 1936. That is quite hot, especially when compared to the record low of —41 deg.

Sault Sainte Marie is in the northeastern corner of the Northeast Central Region and, like Caribou in the Northeast Region, has considerably more snow than the other cities in its region. Caribou and Sault Sainte Marie have another point in common; they are the only two cities of the 33 studied that have a snowfall frequency equal to or greater than 8%. Sault Sainte Marie is the champion with 9.5%, or 345 hours per year with snowfalls of 0.01 inch water equivalent. This totals 83.5 inches (nearly 20 inches less than Caribou's high of 102.3). The greatest fall was 141.3 inches in the winter 1933-34, but about one third of the winters have over 100 inches. In January, 1935, the snowfall was 52.5 inches; that was the heaviest for one month. The greatest in 24 hours was only 14.3 inches, in November, 1943. November 24 is the average date for beginning of a snow cover that lasts throughout the winter. April 11 is the average date for ending snow cover.

The winters are milder than in Duluth but more severe than in Minneapolis. The average year has 9475 degree days; November is the first month to average over 1000—March is the last. Only 10% of the winters have 10,000 or more degree days, as compared to about 36% for Duluth. The prevailing wind is from the east during the winter and, as a result, the polar air masses have been tempered somewhat. Only 28 days have minimum temperatures of zero or below (less even than Minneapolis with 31). Freezing temperatures are recorded on the average of 171 days per year, and 92 days per year never get above freezing. The coldest temperature was —37 — the last time it occurred was in February, 1934. Probably the worst feature about the winters is the relatively infrequent number of clear days—three clear days a month. The lack of sunshine and the low temperatures indicate that a snow melting system would operate frequently; according to Table 2, over one thousand hours per year, assuming that trace quantities occur twice as often as recorded falls of 0.01 inch.

From Table 2, note that the loads would not be excessive. The loads are concentrated in the lower values. Only once every three years would one expect loads in excess of 250 Btu per (hour) (sq.ft.), and only two or three times a year would the load get above 200. The loads are heavier in the western part of the region and, in fact, quite high in Duluth. In examining Table 2, notice the marked similarity in the $A_r = 1$ frequencies for Duluth and Minneapolis. The main differences occurring at the higher loads. These differences probably are due to the colder climate and maybe due to a slightly higher average wind velocity.

Table 3 is unusual in that the Class I design rates for all three cities is lower than the idling rate given in Table 4. (A detailed discussion of idling rate and Class I design rate can be found in the January, 1957, installment of this series of articles for Great Falls, Mont., and Rapid City, S. D.) Minneapolis is the worst offender with a Class I rate just two-thirds of the idling rate.

The Class II rates given in Table 3 look attractive, and, except for Duluth, the Class III rates are quite low. In that sense Sault Sainte Marie is certainly a "natural" for snow melting. Imagine being able to design with an output of 213 Btu per (hour) (sq.ft.) and an expected use of 345 hours per year and an operating time of 1000 hours per year.

The Class III design rate given for Duluth is 374 Btu per (hour) (sq.ft.). After careful examination of Table 2, one could assume that a rate of 374 resulted from rules 1 or 4 of Table 3. Rule 1 states that the design should not be exceeded for two consecutive hours. Rule 4 states that the design rate should provide $A_r = 1$ for 98% of the cases. Since 0.6% of 250 is 1.5 hours per year (as the expected frequency of loads greater than 350 Btu per (hour) (sq.ft.) and 98% of 250 is 245, then it follows that 98% of the falls would require outputs of less than 350 Btu per (hour) (sq.ft.). That means that a Class III rate of 374 is based on rule 1, Table 3.

Because of the high frequency of snowfall, Table 4 shows some very high yearly outputs. The output for a Class I system in Duluth using a design rate of 114 Btu per (hour) (sq.ft.) is 33,200 Btu per (year) (sq.ft.). This is greater than any other *Class III* system of the 33 cities studied. Sault Sainte Marie is second highest and Caribou, Maine, is third. It is interesting to note that the operating costs for a Class III system are not considerably greater than those for a Class I system. Also, the pipe coils are identical for the two systems; therefore, the only economy in selecting a smaller system is in the initial cost of the converter and pump.

In summary, it is certainly true that the Northeast Central Region is an ideal snow melting market. The frequency of snowfall is very high, the winters are long and snow remains on the ground nearly all winter, and the required heat output for melting is not unreasonably high.

Commercial applications would be adequately served with outputs between 150 and 200 Btu per (hour) (sq.ft.) and most emergency or industrial applications would require outputs of approximately 250 Btu per (hour) (sq.ft.). Operating costs would be based on fuel requirements ranging from 20,000 to 40,000 Btu per (year) (sq.ft.). These rates are that high only because of the frequent snowfall. It seems quite likely that snow melting systems will become standard equipment within the near future.

Fish Are Warmed, Not Fried, With LP-Gas.

BELDT'S Aquarium, Inc., Robertson, Mo., reports conversion to LP-gas and adoption of radiant heating and automatic filters have cut its production cost per fish by 75%, doubling output of tropical fish from ¼ million to ½ million a year.

This hatchery, the only one north of Florida where tropical fish are "live-hatched," used to produce nothing but egg-laying tropical fish, such as fresh water angel fish and many popular varieties of tetras. Live bearers were shipped from Florida for distribution. The new system saves approximately $7,000 annually for shipping live bearers to near-by St. Louis.

Installed are two National-U.S. gas-fired boilers. Using a forced circulation system, water heated by the boilers is circulated through ¾-in. copper tubing buried 3 in. deep in 6-in. concrete floors of the indoor fish tanks, heating the water to 75 deg F, required temperature to mature newly-hatched tropical fish.

Beldt purchased its first gas-fired boiler in 1953, installed in a small utility building. Boiler supplies hot water heat through copper coils buried in the floors of covered experimental outdoor fish tanks. Open outdoor tanks growing tropical lillies and other plants have water warmed in the same manner.

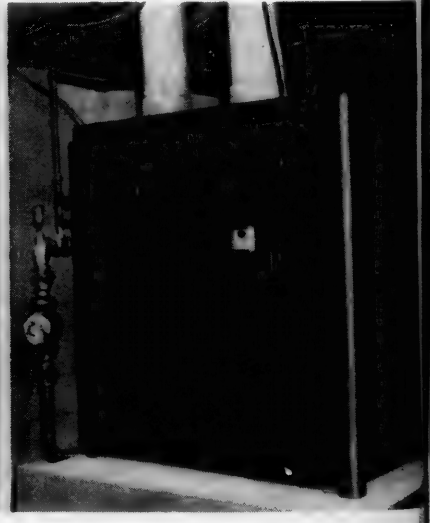
Pleased with this radiant heat operation, the owners constructed a building with 40 fish tanks having a total of 10,000 ft of copper tubing buried half-way deep in their 6-in. concrete floors, on the indoor loading platform of which was set another boiler (illustrated).

Using propane gas, boiler has net I-B-R water rating of 2,430 sq ft, equivalent to 365,000 Btu per hr. Two pumps force heated water into four 2-in. copper mains and thence to the fish tank coils. Since heat loss is greater in sections of the building farthest from the boiler and more exposed to translucent greenhouse lighting, 24 shutoff valves make it possible to heat groups of 5 tanks at a time in the 2-zone system.

General view of Beldt Aquarium. Vats directly behind tank are for raising tropical plants.

With the old system, installed 35 years ago, hot water was pumped through exposed pipes, much like pipes that heat air in a greenhouse. Warm air raised water temperature in the fish tanks. Much more efficient is the present system, where buried copper coils heat the tank water which in turn heats the air.

A 1,000 gal above-ground propane tank supplies an estimated 15,000 gal of LP-gas needed annually to meet fuel requirements. Expected gas bill is $1,500. The 15-ft stack, equipped with a chimney cap to prevent downdraft, costs thirty-five dollars.



At left, tiny tropical fish growing in radiant heated tanks are examined. At right, gas-fired Model 10-W-44 boiler supplies forced circulated hot water to radiant copper coils.

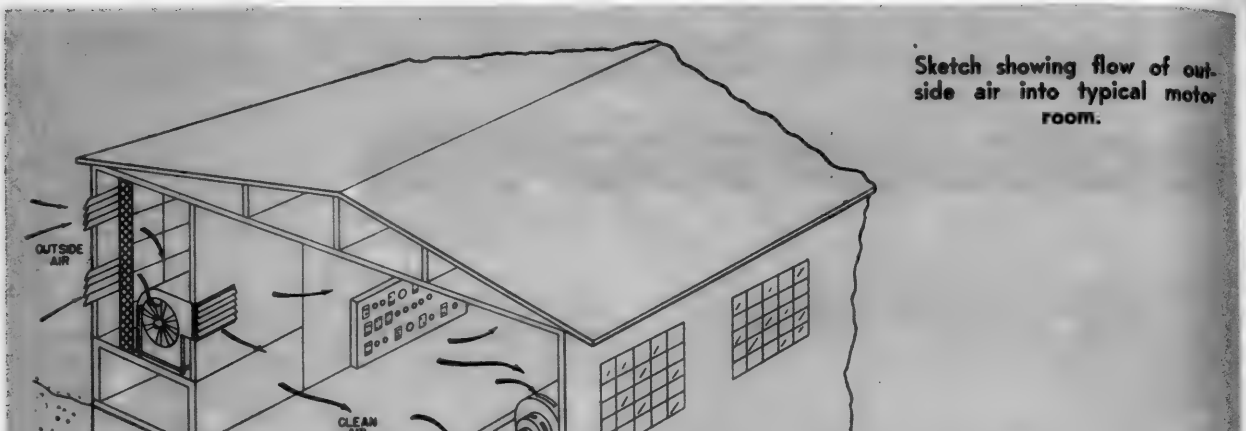
AIR CONDITIONING, HEATING AND VENTILATING'S
Reference Section

Ventilation for Rolling Mill Motor Rooms and Motors

R. G. PLAISTED and W. Y. HUMPHREYS
Westinghouse Electric Corp.

Descriptions of various types of ventilating systems that may be used for motor rooms and how large motors are ventilated.

AIR CONDITIONING, HEATING AND VENTILATING — APRIL, 1957



Sketch showing flow of outside air into typical motor room.

Ventilation for Rolling Mill Motor Rooms and Motors

R. G. PLAISTED and W. Y. HUMPHREYS*
Westinghouse Electric Corp.

Many problems complicate the proper ventilation of motors in rolling mills and the design of ventilating systems for motor rooms in such plants. Chief among these are contaminating gases and moisture in the air, and the large amount of dust particles in the surrounding atmosphere. Various types of ventilating systems that may be used for motor rooms in rolling mills are described and illustrated. Information is presented on how large motors are usually designed to make proper use of air flow for heat dissipation and better motor operation.

MOST of the ventilation requirements of slip ring or commutator-type electric machinery are summed up on a psychrometric chart, Fig. 1. The human comfort zone, shown by the labeled parallelogram, is the area where most people are comfortable and is a combination of the summer and winter comfort zones. It shows a spread of 60 to 75 deg F in dry bulb temperature while the humidity varies between 30 and 70%. Note that the area for best d-c machine operation is not a parallelogram but a triangle.

Consider the boundary on the right side of the triangular area. It is a line representing a dry bulb temperature of 104 deg. (In this article, degrees are Fahrenheit unless otherwise noted.) A d-c or a-c motor or generator converts energy from one form to another. In this conversion process some of the energy is lost in the form of heat. The heat flow law indicates that the temperature difference between the source of heat and the absorber of heat is determined by the rate of heat developed. At a constant load, an electric motor or generator will have constant losses which will produce a constant temperature rise above the surrounding air.

Motor Insulation

The life of the motor insulation is determined, however, not by temperature rise but by absolute temper-

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ature. Figure 2 shows the temperature rating of the three common types of insulation. The life of Class *A* insulation depends on the hot spot temperature which should not exceed 105 deg C. The difference between armature surface temperature and hot spot temperature is 10 deg C. The temperature rise between the surface and the air is 55 deg C. Also shown in Fig. 2 are corresponding hot spot temperatures and temperature rises for Class *B* and Class *H* insulation. Class *A* insulation is composed of organic insulating materials and organic filler; Class *B*, inorganic materials with organic filler; Class *H* is made up of inorganic materials with silicone inorganic fillers. When the hot spot temperature for Class *A* insulation is exceeded, a rule of thumb states that each 8 deg C rise of hot spot temperature, above the rated rise, will decrease the insulation life by one-half. Corresponding figures for Class *B* and Class *H* insulation are 10 deg and 12 deg C.

Insulation Life

It is difficult to say what is the expected life of insulation for there are machines in which insulation lasts from 30 to 40 years. The 104 deg line corresponds to 40 deg C, which is the common ambient temperature for all the classes of insulation. As far as insulation life is concerned, the motor would have maximum life if it were operated in the lower left corner of the triangle. The air in the vicinity of the windings will not stay under 40 deg C unless it is constantly replaced. An accepted industry standard is the figure of 120 cfm per kilowatt of machine loss. The ability of air to absorb heat depends on its pressure, temperature and moisture content. Between 0 and 70 deg C, the temperature rise of this 120 cfm of air will vary 24% due to expansion. At 100 deg ambient, the temperature rise will drop about 2% when going from 0 to 100% humidity. A figure which is sufficiently accurate at normal temperature, assuming all the losses go into the ventilating air, is that of 25 deg rise when 120 cfm per kilowatt loss is supplied.

The problem is—what can be done when, as in some parts of the country, the outside air reaches occasional values over 104 deg in the summer? Coolers incorporating a heat exchange recirculating system can sometimes be used. If no coolers are used, in an arid region, water spray cooling will lower the dry bulb temperature

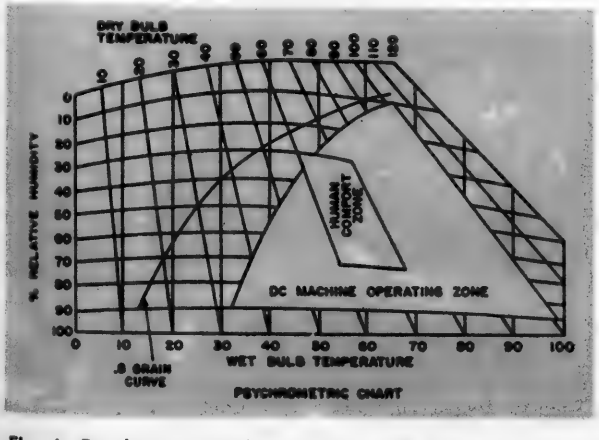
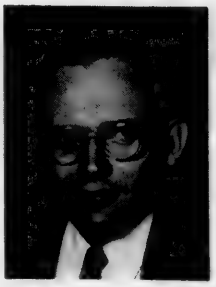


Fig. 1. Psychrometric chart showing the human comfort zone and best d-c machine operation zone.



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W. Y. Humphreys, since 1956 Central Region Manager, Westinghouse Sturtevant Division, graduated from Massachusetts Institute of Technology in 1945 with a degree in Naval Architecture and Marine Engineering. Following his participation in the Westinghouse Graduate Student Training Course, he joined the Sturtevant Division at Hyde Park, Mass. In 1950 he moved to Pittsburgh as a sales engineer and worked closely for five years with the company's Steel Mill Section on the selection and design of ventilating equipment. He is a member of ASHAE.

since some of the heat in the dry air will be used to evaporate the water spray. The maximum amount of cooling possible would be to produce 100% humidity where the room air would be at wet bulb temperature. The amount of air required for modern rolling mills becomes large as the horsepowers go up. In one installation where the total horsepower driving the main drive rolls and the edger rolls is 16,000, the total amount of air for the rotating equipment is 255,000 cfm.

Motor Ventilation

How large motors are usually designed to make proper use of the ventilated air is sketched in Fig. 3. For this d-c machine, it is common practice to bring the ventilated air into the back end of the machine, direct it along the shaft through the holes in the spider and then outward through slots in the armature, past the commutator. Figure 4 shows how a wound rotor motor is ventilated. The air is brought up at each end of the motor, is directed through the machine windings, and then out through the center of the machine from which it is conducted either up for an up-draft system or down for a down draft system. Since the air is much colder in winter, it would be possible to cut down on the quantity of air and thereby allow the motor room to be warmer. However this is not advisable since a certain amount of air turbulence is necessary to provide adequate cooling of all surfaces. Reducing the quantity of air would result in a smoother flow of air without as much of the required turbulence.

Moisture Effect on Oxidation

The curved boundary at the left of the triangular area on the psychrometric chart, Fig. 1, represents points of absolute humidity which correspond to a constant amount of moisture in the air following a standard dewpoint curve. A sensitive spot in the performance of an other-

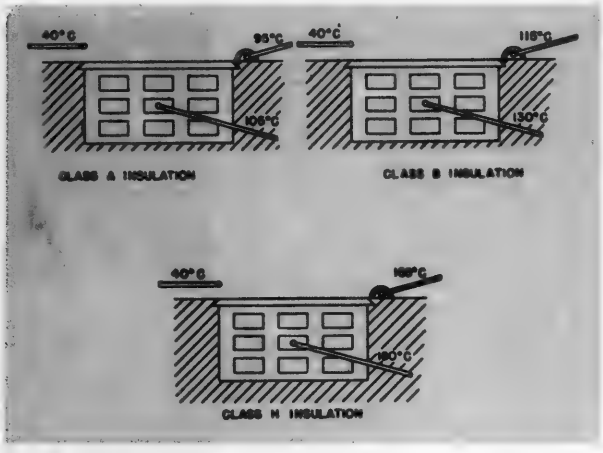


Fig. 2. Hot spot temperatures and temperature rises for Class A, Class B and Class H insulation.

wise rugged motor or a generator of the direct current type is the commutator. The life of the brushes and commutator depend on a commutator film which is about 2.1 millionths of an inch thick. This thickness is divided between copper oxide and a layer of carbon from the brushes. The copper oxide comes from the oxidation of the copper of the commutator. When current passes from the commutator to the brushes, in the minute areas where current actually flows, the copper oxide is reduced to plain copper and the oxygen combines with carbon to form carbon monoxide. As the commutator passes out of the range of the brush, the copper is reoxidized.

It is believed that this oxidizing effect is aided by the presence of moisture in the air which acts as a catalytic agent. This action depends on the absolute amount of moisture in the air. Commutation is best at a moisture content of 2 grains water per cubic foot of air. Commutation becomes completely intolerable at a moisture content of 0.8 grain per cubic foot of air, although commutation steadily becomes worse after the amount of water decreases below that of 2 grains per cubic feet. The amount of water in the air is just as dependent upon the temperature of the air as upon the relative humidity of the air. At 32 deg, and 100% humidity there will be the required 2 grains water per cubic foot. However, if the temperature drops to 11 deg and 100% humidity is maintained, the moisture content drops to the intolerable amount of 0.8 grain water per cubic foot. When the amount of water in the air is insufficient, the commutator film breaks down and the brushes wear away at such a rate that although normal brush life would be expected to be between one and two years, brushes may completely grind away overnight. Since low moisture content in the air usually occurs during winter, ways should be developed to add moisture to the air at the same time the air temperature is raised.

Relative Humidity

The third line on the area of operation for d-c machines is that of percent relative humidity. Percent relative humidity has a bearing on machine performance only if conditions arise where moisture is actually condensed from the atmosphere and works into the machine windings or else forms a coating on the commutator. This does not happen as long as the machine is running because it will always be warmer than the surrounding air and therefore will never take up moisture. However, when machines are shut down for long periods of time, conditions may arise where the machine is below dew-point temperature from the night before and the area in which the machine is located has warmed up. In this case, moisture can condense from the surrounding air into the insulation of the machine thus reducing its dielectric strength. This is avoided in practice by the use of motor heaters which automatically turn on to allow warm air to flow through and over machine windings by convection during the period when the machine is not operating.

Influence of Dust in Air

The outside air which must be drawn in to provide the heat exchange effect for machines is not perfectly clean. It contains dust particles which figures indicate have an average weight of 0.6 grain per 1000 cu ft of air. These dust particles are very small, many of them too small to be seen individually by the naked eye. The value of 0.6 grain per 1000 cu ft does not seem at first to be excessive. Going back to the figure of 255,000 cfm required for the main drive motors and generators for the slabbing mill mentioned, it is found that 32 lb of dust and dirt per 24-hour day would be brought into these machines if there were no air cleaning facilities. In addition, the carbon brushes, as they wear away, produce very fine particles of brush dirt. The dirt, plus the brush dust, causes a reduction of insulating value of the insulation as it forms a continuous coating on the windings which, in the presence of a small amount of moisture, is conducting. It also reduces the life of brushes by settling on the commutator and creates extra commutator friction. It acts as heat insulation, increasing machine temperature rise. It is highly important that as much as possible of this dirt be removed from the machines before it enters the motor room.

A problem difficult to solve is that of contaminating gases in the atmosphere. Either sulfur dioxide or hydrogen sulfide in the air in parts for sulfur dioxide as low as 2.4 ppm (parts per million) and in the case of hydrogen sulfide as low as 6 ppm can cause bad commutation life. In either case, copper combines with the sulfur and the resultant copper sulfide is not bonded as well with the parent copper as the copper oxide nor-

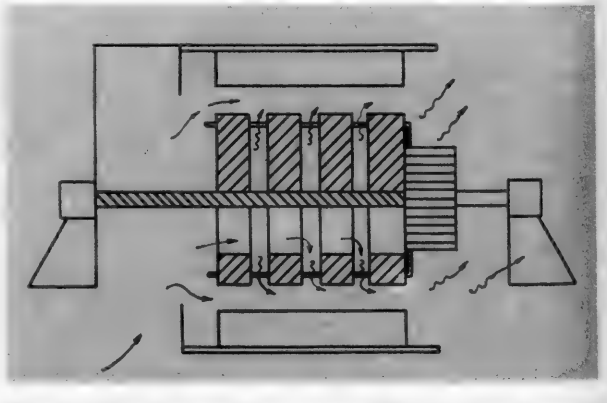


Fig. 3. How large motors are usually designed to make proper use of the ventilated air.

mally present in commutator film. The copper sulfide then has a tendency to be picked up in the brushes. After being picked up, it is reduced, and resultant copper makes it appear as if the parent copper lost some of its material directly to the brushes. Actually when pieces of the copper sulfide are picked up, the resultant break is an area of much greater current concentration than is the surrounding area resulting in pitting and in the excessive wear of the commutator and bad commutation. The small quantities of these gases necessary to cause trouble make them difficult to detect since the quantities are less than the amount the human nose can smell. Practically the only solution used to date for this problem is that of using abrasive brushes which wear away the copper sulfide film before it gets thick enough to be picked up.

Motor Ventilation

The ideal motor ventilation system is called on to perform the following functions:

1. Provide the proper quantity of cooling air.
2. Provide sufficient pressure to circulate it through the equipment.
3. Remove all airborne contaminants.
4. Provide for dissipation of heated air.
5. Eliminate any carbon brush dust generated in the system.
6. Provide ambient temperatures within the ranges discussed.
7. Provide proper humidity values for maximum brush life.
8. Prevent infiltration of dust and dirt and fumes into the system.
9. Permit an arrangement of equipment which will be accessible and which will require a minimum of maintenance.

Motor Rooms

It is not absolutely necessary to have a motor room to successfully ventilate a modern rolling mill motor or motor generator set. Generally a motor room is used and is desirable since it provides a convenient clean, dry, isolated place for the mounting of control apparatus and switchgear in addition to the main motors and motor generator sets. A study was made to see how much heat was developed by main drive equipment compared to the

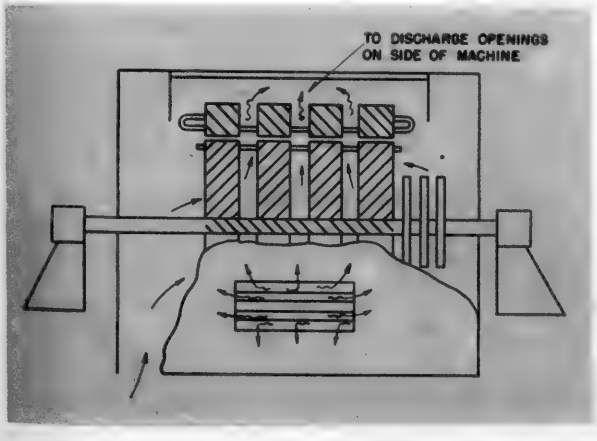


Fig. 4. Ventilation scheme for wound rotor motor.

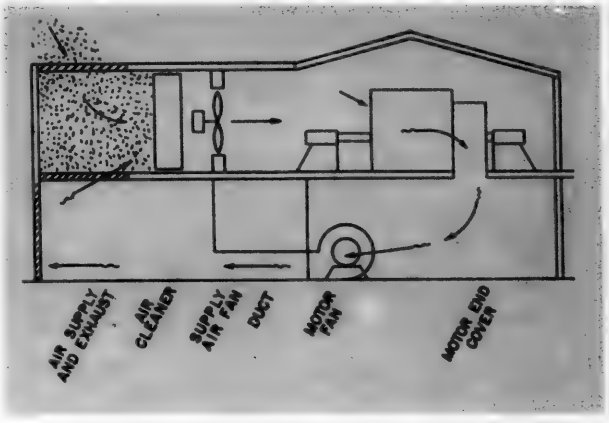


Fig. 5. Non-recirculating down-draft system has medium initial cost.

heat required for winter time motor room heatings. Various calculations were made on the assumption that the motor room was a separate building and that it had walls and ceiling composed of Galbestos siding. It was found that in the case of the blooming mill mentioned, with

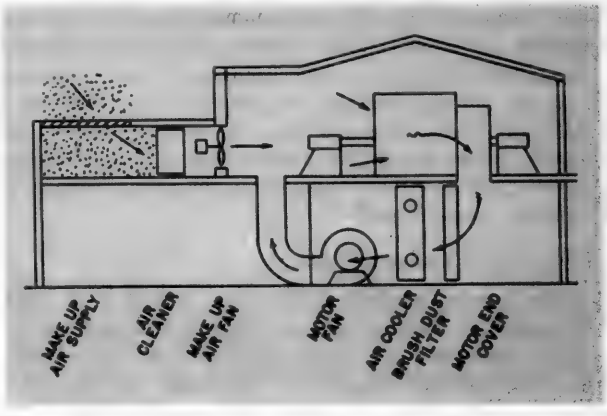


Fig. 6. Recirculating down draft system with motor room.

a total of 255,000 cfm for the main drive motors and generators, that a 103 deg temperature rise could be expected above that of the outside temperature. This was based on the assumption that all the air discharged from the machine should be circulated furiously around the motor room to provide a constant air temperature throughout the motor room. In another installation where the horsepower of the main motors was only 4400, the temperature rise of the air in the motor room above that of the outside air was found to be over 200 deg. This was due to the very restricted size of the smaller room.

Other problems which primarily have to do with motor rooms are those of stack effect and of windage. Working on the basis of a 60 ft high motor room and a temperature difference between the motor room air and the outside air of 70 deg, calculations showed the difference in pressure caused by the weight of the motor room air at ground level compared with the weight of corresponding 60 ft of outside air at ground level to be 0.13 inches of water. Calculations were made to see what amount of pressure could be produced in a motor room due to a 15 mph wind. It was found to be about 0.1 of an inch of water. The total of these effects, which is cumulative

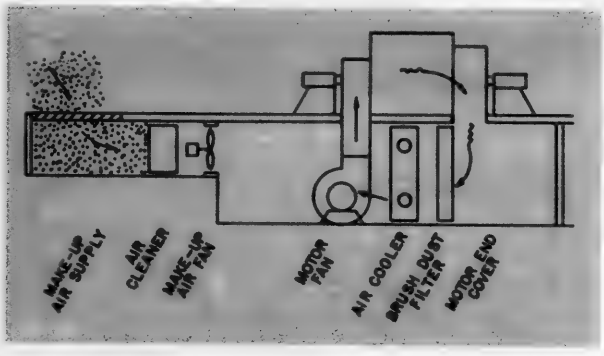


Fig. 7. Recirculating down draft system without motor room. It has low filter maintenance.

on one side of the building, represents a pressure of 0.23 or roughly ¼ inch of water.

Thus, ventilating fans must supply a pressure which is equivalent to this figure to prevent dirt from coming into the motor room from the outside. It is difficult to predict what quantity of incoming air will produce the desired pressure. In industrial construction, one air change per hour is assumed to be caused by infiltering air from the outdoors. It is fairly common practice to design makeup air requirements so that about four air changes or perhaps five are produced per hour by the air coming into the motor room from the outside. Four air changes per hour is the most realistic way that stack effect and windage effect can be compensated for since any infiltering dirt will soon be eliminated by the greater volume of clean air being expelled.

Down-draft Ventilating System

The closest approach to the ideal system is to house the motor in a motor room and supply cooling air under slight pressure to the room in what would be called a non-recirculating down-draft ventilating system as in Fig. 5. The system is non-recirculating since there is no means included to cool the air after it has been forced through the motor and, therefore, it must be exhausted. It is down-draft because the flow of air leaving the motor at the commutator end is downward through the floor and into the basement area beneath the motor.

The principal components of such a system would include a louvered fresh air intake and air cleaner, supply air fan, motor room, motor with cover on one end, motor fan—exhaust duct and exhaust and recirculation air dampers. The recirculation air is used in periods of cold weather to temper the incoming fresh air and thereby keep the motor room temperature at a comfortable level. The major advantage of this system—and it applies to all non-recirculating systems in that no cooling water is used—is that the air alone is the cooling medium.

By using supply air fans of slightly greater volume capacity than the motor fans, the motor room can be kept at a positive pressure. This eliminates dirt infiltration through doorways and other motor room openings since all air leakage would be outward. In the summertime the motor room can be kept at essentially the same temperature as outside. In cold weather, partial recirculation of the heated air allows the utilization of the kw losses from the motor to heat the room. This also can afford a considerable maintenance saving on the air cleaner since the recirculation air is generally considerably cleaner than outside air and therefore the greater the percent of recirculated air, the lower is the dirt load on the filter. Note, too, that with this system any brush dust from the motor is eliminated either by being exhausted outside or by being removed by the supply air cleaner.

Although it is not shown in the system, provision for humidity control can be readily applied by adding a humidifier or spray type air washer in a portion of the recirculated air.

Recirculating System

Where a good supply of clean cold water is available for use as the cooling medium, a recirculating system can be used as in Fig. 6. Diagrammatically it is similar to the previous system except that water-to-air heat exchangers have been added and the full air volume is recirculated at all times rather than exhausted as was the case in the other system.

The supply air system now is much smaller since its function is to provide only the air necessary to pressurize the motor room and this may be only 10 to 20% of the volume of air actually circulated through the motors.

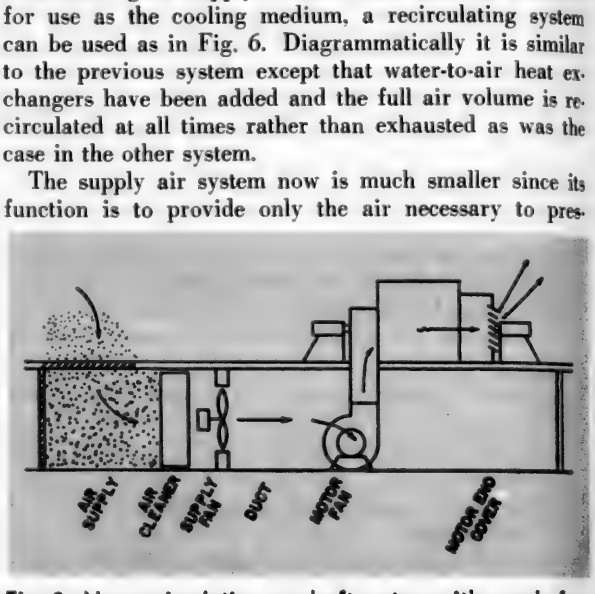


Fig. 8. Non-recirculating up-draft system with supply fan. Reverse air flow is impossible.

A disadvantage of this system, besides the fact that large quantities of cooling water are necessary, is that brush dust from the d-c machines is recirculated in the system. Attempts to alleviate this condition generally take either one of two courses. One way, Fig. 6, is to provide brush-dust filters. Carbon brush dust however is extremely fine and collection efficiencies of ordinary mechanical filters on this application are low.

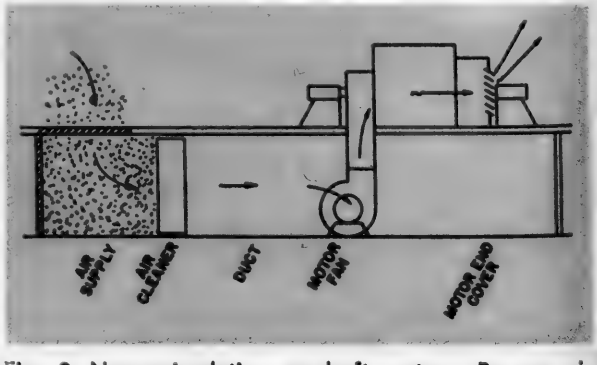


Fig. 9. Non-recirculating up-draft system. Reverse air flow prevention is required.

The other approach is to rely on the make-up air to dilute the brush dust laden air. With an electrostatic filter on the make-up air supplying approximately 4 or 5 complete clean air changes per hour to the room, the carbon dust concentration in the recirculating system is continuously being diluted.

Use of End Covers

When it is not possible to provide a motor room and the motors must consequently be located in a mill area, and covers are used on both ends of the motor and the complete ventilating system is kept in the basement or foundation space. See Fig. 7. A make-up air system is still required, however, to pressurize the system and to insure outward air leakage especially where the motor shaft passes through the motor end covers.

The advantage of this arrangement is that it is compact but access to the various ventilation components is often restricted. In the case of a large m-g (motor generator) set for example, the problem of how to duct the air from the motor and perhaps several generators to the fan and cooler and back to the motors and generators again is not an easy one.

At times, a non-recirculating system is used, Fig. 8, and the motors are located in a mill area without benefit of a motor room. Covers on both ends of the motors would be used with the one on the inlet side directing air up from the fan into the motor and the one on the discharge side equipped with louvers to allow escape of the heated air into the surrounding area. Filter maintenance on this system will be the highest of all since the filter or air cleaner will be handling dirty air 100% of the time.

If the motor fan on this system were shut down, then the supply fan, which is being used to keep the basement under pressure, would keep air flowing up through the motor, but not in a sufficient amount to prevent dirt from getting into the motor through the end cover louvers.

In the arrangement of Fig. 9, the basement area is under suction. Assuming we have two or more motors, then if one fan is shut off, mill area dirt would immediately be drawn backward into the motor through the motor end cover louvers. Back draft dampers on the fan would help prevent this and would definitely be required. Thus non-recirculating up draft ventilating system is the most common arrangement where ventilation on one large machine only is required.

Costs

An interesting comparison of relative costs of ventilating systems for installations of 800 kw loss or more is given in Fig. 10. In this illustration *A* shows the cost of a non-recirculating up-draft system with oil film type cleaner; *B*, non-recirculating up-draft system with electrostatic cleaner; *C*, non-recirculating down-draft system with electrostatic cleaner; *D*, recirculating down-draft system with 10 deg differential of water and ambient air;

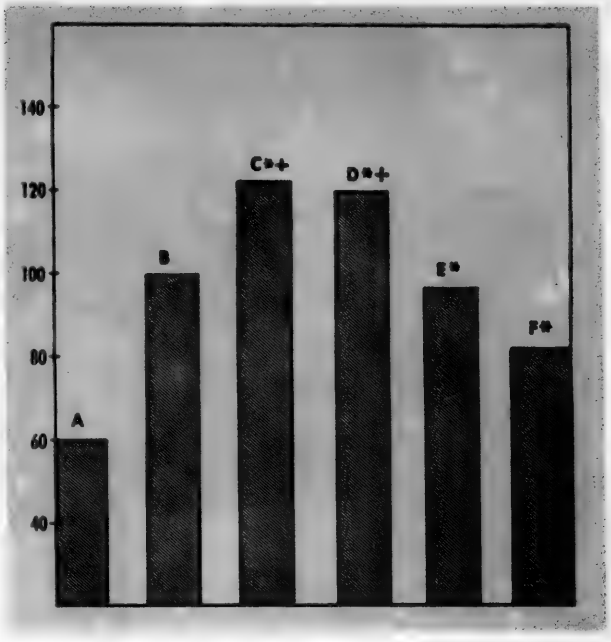


Fig. 10. Comparative costs of various system.

E, recirculating down-draft system with 25 deg differential of water and ambient air; *F*, non-recirculating down-draft system with oil film type cleaner. In Fig. 10 (*) indicates plus cost of motor room where used, and (+) plus cost of cooling water piping.

Installation Practice

The ventilating system on a large mill installation takes more abuse than any other single item. Often the fresh air supply duct has to come down between crane rails—100,000 cfm of air through a duct 2 ft deep and 50 ft wide.

Filters are often zig-zagged, overlapped, and even left out completely because of space restrictions. In one case the supply fans, which were good sized ones, had to be hung from the ceiling to get them in.

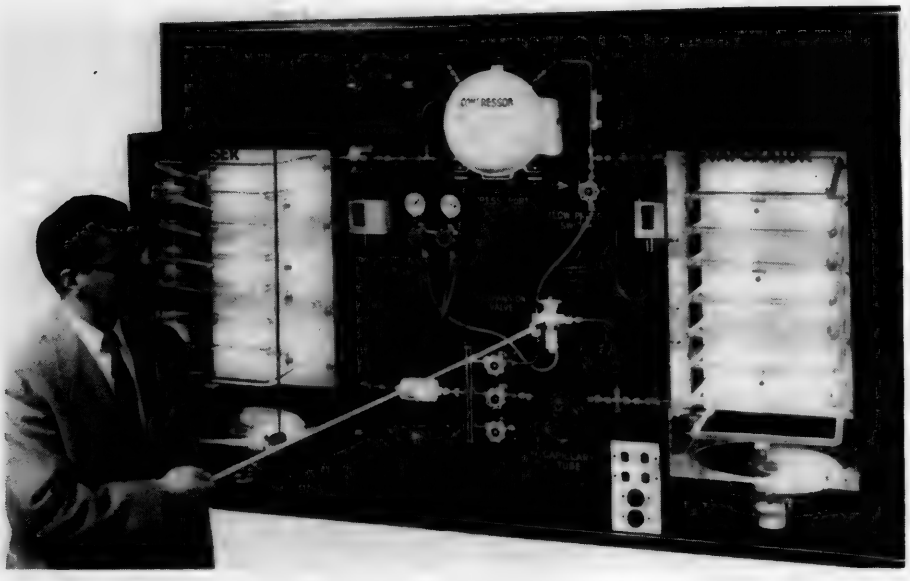
Concerning space requirements there are a few rules which, if followed, can help to assure a good installation:

First of all, air velocities through filters should be uniform over the face of the filter. This is most important. The average range is 300 to 400 fpm depending upon make and type of units.

Louvered air intakes should be large enough to keep the air velocities around 500 fpm and intake ducts should be sized for not much over 1000 to 1200 fpm.

Fan outlet velocities and exhaust duct velocities should range between 2400 and 2800 fpm on the average.

The location of the air intake is perhaps singly the most important factor in ultimate filter maintenance.



Janitrol's Senior Field Engineer Robert Mees, is shown pointing to the spot where the cooling cycle begins in this model air conditioning system. Display was designed and constructed by Mees for training purposes in company's Columbus, Ohio, engineering laboratory. Two principal operations in an air conditioning system, evaporation and condensation of refrigerant are plainly visible in glass co

Picture Paragraphs

One winter night when temperature in Lafayette, Ind., fell to —10 deg F, the goldfish bowl froze over in the living room of old farmhouse near Purdue University Agricultural Experiment Station while oil burner was running. At suggestion of Prof. N. K. Ellis, building was wrapped entirely, with exception of doors and a few windows, in Bakelite polyethylene film. While it will require several seasons of testing by Purdue's Dept. of Agricultural Engineering to determine effectiveness of the film, it is known that occupants of farmhouse were able to turn down oil burner last winter on even coldest nights.

Aluminum-covered mounds shi ing in sun near Ogden, Utah, a "pickled" locomotives. Proce used by Army Transportati Corps to preserve valuable equi ment, consists of covering e gines with sheets of osnabu cloth over which coats of plas and tar are sprayed. Final co is aluminum paint, employed f its ability to keep temperatu inside units more constant b reflecting heat from the sun.

A new vaneaxial blower (see News of Equipment and Materials) supports engineer with blast of air. Developed for use on atomic submarines by General Dynamics Electric Boat Div., the fan has many applications in air conditioning and ventilating fields.

This wafer valve disc, weighing 1701 lb, was cast by Buffalo Foundry of Allegheny Ludlum Steel Corp. Stainless steel valve, designed for 25 psi, is 48 inches in diameter and will be used in circulating salt water system of southern electric power company.

Scale model of triple-purpose structure, Dupont Plaza Center, Miami, shows docking, parking, and flying facilities. The center combines a 100,000 sq ft display unit for the International Architects Bureau of Building Products, 70,000 sq ft of office space, and a 301 room hotel.

BOOK REVIEWS

Publications abstracted in this department should be ordered direct from publisher.

REFRIGERATION AND AIR CONDITIONING

Intended primarily as a text book for senior and graduate study, Refrigeration and Air Conditioning by Richard C. Jordan and Gayle B. Priester, may also be used as a reference book. The authors are, respectively, head, department of mechanical engineering, University of Minnesota, and air conditioning engineer, Baltimore Gas and Electric Company.

The text is a second edition of a book first published in 1948. It is being used in a number of engineering schools where these subjects are taught.

The subject matter is divided into five sections as follows: 1. Introduction including a review of thermodynamics; 2. refrigeration cycle analysis and compression refrigeration machines; 3. fluid flow, heat transfer psychrometrics and their refrigeration applications; 4. advanced refrigeration topics; 5. refrigeration applications. Included in a pocket in the back of the book are pressure-enthalpy diagrams for various refrigerants, as well as psychrometric charts.

Refrigeration and Air Conditioning, by R. C. Jordan and G. B. Priester. Cloth bound, 6 x 9 inches, 555 pages. Published by Prentice-Hall, Inc., 70 5th Ave., New York 11, N. Y. Price, $8.

BLUEPRINT READING

Blueprint Reading, by the Chief of Naval Air Technical Training and the Bureau of Naval Personnel, was prepared to provide the student with basic information. This book is one of the basic Navy Training Courses and represents the joint endeavor of the Naval Air Technical Training Command and the Training Publications Section of the Bureau of Naval Personnel.

The various chapters of the book cover blueprint views, lines and sections, dimensions, bills of material, layout tools, layout geometry, curve or bend allowance, templates, electrical blueprints, symbols, architectural and structural drawings.

Blueprint Reading—one of the basic Navy Training Courses. Cloth bound, 5 x 7½ inches, 242 pages. Published by Arco Publishing Co., 480 Lexington Ave., New York 17, N. Y. Price, $3.

PUMP SELECTION AND APPLICATION

The basic types of pumps and problems that are encountered by the engineer in their application, are covered in Pump Selection and Application, by Tyler G. Hicks, special projects editor, *Power*.

This book covers the field of industrial pumping. In it are step-by-step procedures for analyzing a pumping problem, finding the most suitable commercial pump for a specific job, and then applying this pump to the conditions encountered. Numerous examples are presented for study and as guides.

After discussing the various types of pumps, there are chapters on head, pump capacity, liquid handled, piping systems, drives for industrial pumps, pump selection and pumping system economics. The section on applications deals with power plant services, nuclear energy applications, petroleum industry, chemical industries, textiles paper and rubber, food processing and handling, water supply, sewage and sump services, air conditioning and heating, irrigation and flood control, mining and construction, marine services, industrial hydraulic and vacuum pumps, iron and steel and other industries.

Over 400 illustrations are used to clarify portions of the text—to illustrate characteristics and applications.

Pump Selection and Application, by T. Hicks. Cloth bound, 6 x 9 inches, 422 pages. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. Price, $8.50.

HEAT TRANSFER

Basic and fundamental data are presented in Principles of Engineering Heat Transfer, by Dr. Warren H. Giedt, associate professor of mechanical engineering, University of California.

Treatment of the subject is based upon a background in physics, mathematics and thermodynamics. Although special effort was made to provide a physical interpretation of the many quantities and processes, rather extentensive analytical material is also included.

Some of the chapters follow: Fourier conduction equation; one-dimensional steady-state conduction; two-dimensional state-state conduction; ideal and viscous fluid flow; laminar flow convective heat transfer; turbulent flow convective heat transfer; natural convection heat transfer; condensation and boiling heat transfer; thermal radiation; radiation heat transfer; transient and periodic heat transfer; transient temperature variation in solids; heat exchangers.

Principles of Engineering Heat Transfer, by W. H. Giedt. Cloth bound, 6 x 9 inches, 372 pages. Published by D. Van Nostrand Co., Inc., 120 Alexander St., Princeton, N. J. Price, $8.25.

NATIONAL PLUMBING CODE HANDBOOK

Plumbing codes have always been a source of confusion to many who have had to use them. Therefore, those concerned with the specifications, performance and design of plumbing systems will find much of value in the National Plumbing Code Handbook, edited by Vincent T. Manas. It is based on the National Plumbing Code ASA A40.8 which has already been adopted by 30 states and many municipalities.

The entire code is covered in Parts I and II of the book, with each paragraph of the code quoted and then explained in non-technical language. Part III covers phases of the sciences of hydraulics and pneumatics which are inherent in plumbing systems. A great deal of the scientific and research data produced at the National Bureau of Standards and other nationally recognized research centers and universities are published here for the first time.

National Plumbing Code Handbook, edited by V. T. Manas. Flexible cover binding, 5½ x 8 inches, 544 pages. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. Price, $7.50.

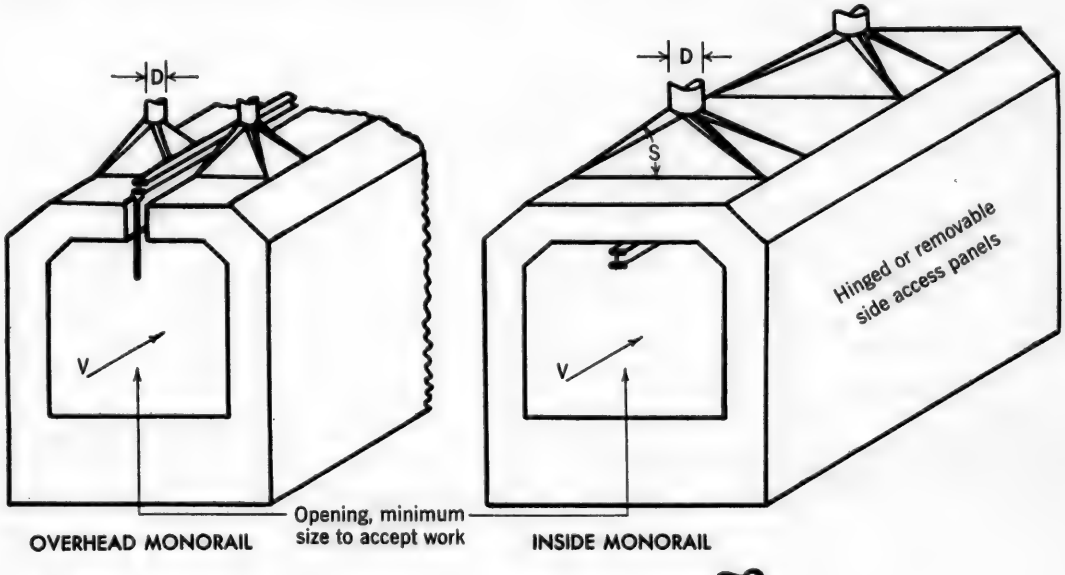
EXHAUST SYSTEMS FOR ENCLOSING HOODS

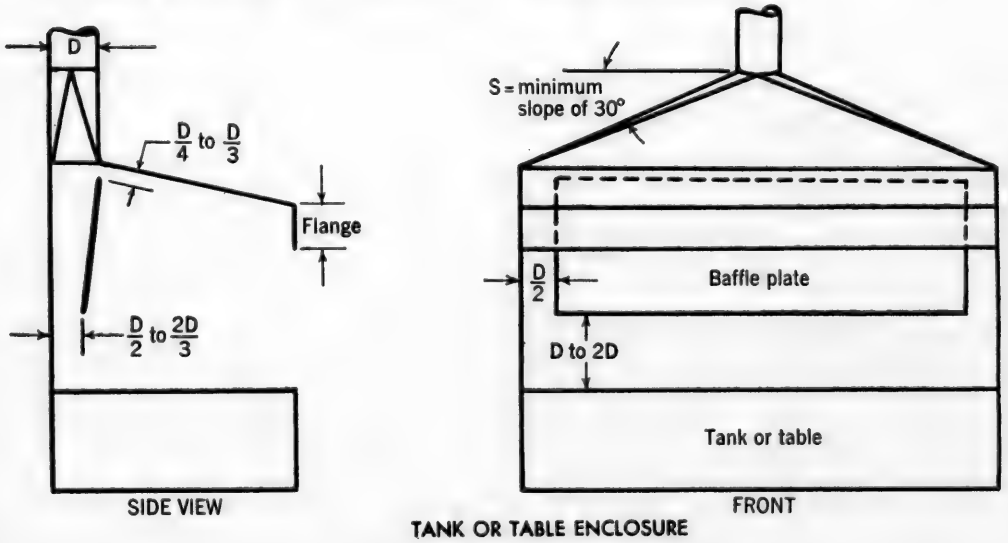
For Tanks, Tables or Drying Operations

Air quantity required (cfm) = face area (sq ft) x face velocity (ft per min). Face area includes all openings into the enclosure.

D=pipe diameter sized for 1500 to 2500 fpm

Typical face velocity which varies with the process, is from 50 to 100 fpm, depending on local environmental conditions.





TANK OR TABLE ENCLOSURE

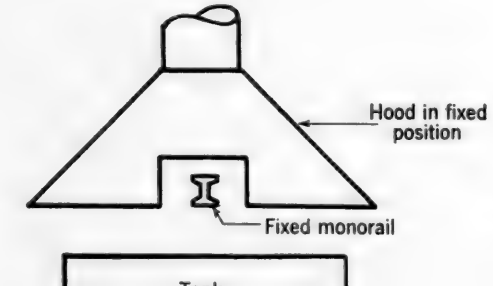
Drawings Through Cooperation of New York State Department of Labor
Division of Industrial Hygiene—Engineering Unit

EXHAUST SYSTEMS FOR CANOPY HOODS

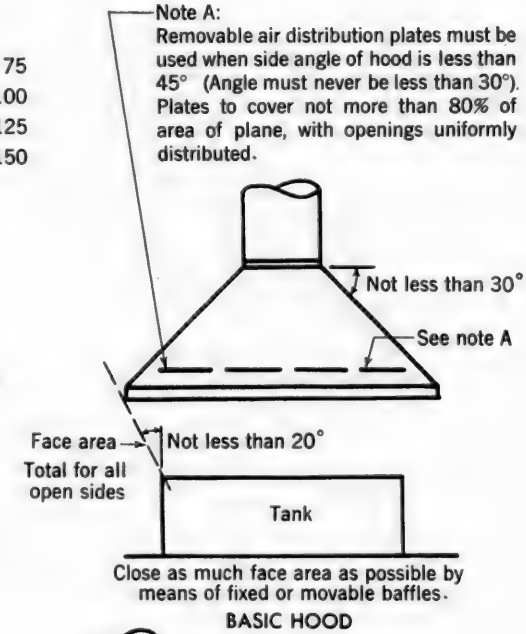
Where Operator Does Not Work Over Tank

Air quantity required (cfm) = face area (sq ft) x face velocity (ft per min). Select duct diameter to maintain duct velocity between 1500-2500 fpm.

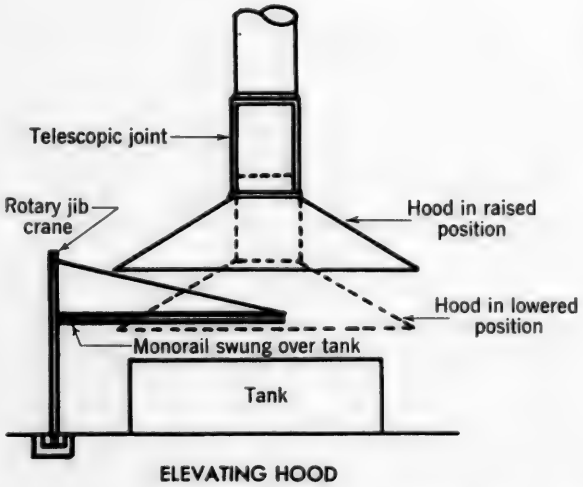
Typical face velocity (fpm varies with process)	
No cross room drafts or baffles on three sides	75
Slight cross room draft or baffles on two adjacent sides	100
Moderate cross room draft or baffles on two opposite sides	125
Considerable cross room draft; must have baffles	150



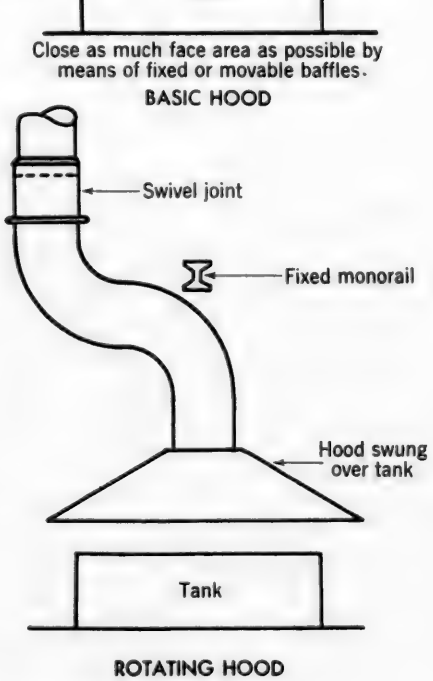
FIXED HOOD


Note A:
Removable air distribution plates must be used when side angle of hood is less than 45° (Angle must never be less than 30°). Plates to cover not more than 80% of area of plane, with openings uniformly distributed.
Not less than 30°
See note A
Face area
Total for all open sides
Not less than 20°
Tank
Close as much face area as possible by means of fixed or movable baffles.

BASIC HOOD



ELEVATING HOOD



ROTATING HOOD

Drawing Through Cooperation of New York State Department of Labor
Division of Industrial Hygiene—Engineering Unit

Below and on the following pages are given brief digests of the advertisements appearing in this month's issue. Use this Digest to locate and refer to the advertisements in which you are particularly interested, then fill out and mail the prepaid postcard to request further information from manufacturers.

The items appear in the same order as the advertisements to which they refer, to facilitate obtaining further information after reading an advertisement. NOTE: All advertisements are digested here except those received too late for inclusion. The Index of Advertisers lists all the advertisements in this issue.

Use the postcard below for catalogs, new equipment and materials, as well as Ad-Digest items.

STEAM TRAPS. None other give as quick heating, easy installation, with integral strainer and stainless mechanism in low pressure heating service. Self-scrubbing, non-air binding, and immune to corrosion, stock is stored in over 100 cities. Steam trap book, covering all data and prices, available.
Page Inside Front Cover — Item 108

ROOF VENTILATOR. Whisper-quiet, with low silhouette, centrifugal roof ventilator is ideal for schools, hospitals. Moves large volumes at low running speeds against static head. Catalog available.
Page 1 — Item 109

THROUGH-THE-WALL UNITS. No ducts, cooling towers needed with these self-contained units installed room by room, without loss of revenue during change-over in existing buildings, economically in new buildings. Cools in summer, steam or hot water heat in winter. Bulletin available.
Page 2 — Item 110

DUAL CONTROL VALVE. Unit consists of a reducing valve which can be serviced in the line, built-in ball-type check valve with noise-free operation, and bottom drain relief valve for most economical drain-pipe hookup. Information available.
Page 4 — Item 111

ALUMINUM INSULATION. How to insulate masonry walls, get 2-inch wall insulation value, and create 1-inch wall space, to protect masonry walls against heat loss and dampness is subject of ad. Free copy of Federal bulletin on moisture condensation in building walls offered.
Page 7 — Item 112

WROUGHT IRON PIPE. To check corrosive attack in pipe carrying brine for ice skating rinks at the Kentucky Fair and Exposition Center's Coliseum at Louisville, designers specified 52,000 feet of 1-inch wrought iron piping. Special report on ice skating rinks is available.
Page 9 — Item 113

STORAGE WATER HEATERS. New addition to this company's catalog on storage water heaters now ready. All information required for architects, engineers and contractors is included. Sections on plain steel, copper lined, copper silicon, cement lined heaters are complete with installation data.
Page 11 — Item 114

FANS. Company's type BL fans are known for their low noise level, endurance, and efficiency in heavy-duty industrial applications; their stability under broad variations of pressure and volume requirements; for big Class 1 air handling jobs. Bulletin available.
Page 13 — Item 115

AIR CONDITIONING CONTROLS. Company's modern control system maintains the proper air conditioned climate so essential for people making vital decisions, as illustrated in ad showing the Canadian Joint Staff and Department of Defense Production Building, Washington, D. C. Information available.
Pages 14-15 — Item 116

POWER ROOF VENTILATORS. Low silhouette, demanded for modern buildings, and quiet, trouble free operation are assured by this company's direct connected motors with permanently lubricated ball bearings, exclusively for fan use. All aluminum housing never needs painting. Bulletin available.
Page 17 — Item 117

CENTRIFUGAL WATER CHILLER. Nineteen years of practical experience by this company with central centrifugal water chillers guarantee user many years of trouble free operation. Units efficiently control capacity. Extensive published ratings are available. Low noise level. Information available.
Pages 18-19 — Item 118

HEAT, COOL MOTELS WITH WATER. Comfortable heating, summer cooling, hot faucet water, zone control, and snow melting, are all provided for with this company's equipment. Hot water heat has the superior comfort advantages of radiant heat, as many motel installations attest to with full occupancy.
Pages 20-21 — Item 119

CENTRAL CONDITIONING CONTROL. Truly automatic air conditioning is illustrated with layout for installation including heat pump, and illustration of central control panel. Air mixer for dual-duct high velocity that provides constant delivered air volume without need to recalibrate after adding to system shown. Information available.
Pages 22 thru 25 — Item 120

DRIP-PROOF MOTORS. Manufacturer's drip-proof motors have been tested in tough air conditioning jobs and proved outstanding for rugged performance, dependability, and quiet operation. Information is available.
Pages 26-27 — Item 121

AUTOMATIC REGULATING VALVES. Any valve designed to control temperatures or pressures within tight limits can be affected by dirt or other foreign matter in steam lines. Trouble shooting is faster, downtime is reduced. Bulletin is available.
Page 28 — Item 122

REFRIGERANTS. Company's complete line of refrigerants is available at your wholesaler for your every need. They are non-corrosive, non-toxic, non-flammable, stable, and safe. Information available.
Page 29 — Item 123

HEATERS, VENTILATORS & FANS. Pictured are five installations of heating, exhausting, and ventilating equipment at Maytag's Iowa plants. Applications to warehouse, repair areas, and porcelaining oven illustrated. Information available.
Pages 30-31 — Item 124

AIR FILTERS. One roll of this company's media, made from broken glass, and precharged with viscosine, a product developed to retain its non-oily consistency under all temperature and humidity conditions lasts a year in normal use. Changing media is as simple as changing film in a camera. Bulletin available.
Page 32 — Item 125

Circle numbers corresponding to the items and advertisements in which you are interested. Print your name and address clearly. Information will be sent directly from manufacturers.

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information.

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PLEASE PRINT April, H-57

This service available only to U.S. and Canadian readers.

Name .....

Firm .....

Nature of Firm's Business .....

Street .....

City .....**Zone** ....**State** .....

This card is void after July 1, 1957

Ad-Digest

VENTILATING FAN. Catalog bulletin on utility-type ventilating fan, that won such approval at the IH&AC Exposition, will be available soon. Backwardly curved blade wheel has non-overloading horsepower characteristic.
Page 33 Item 126

BRASS GATE VALVES. The contractor's preference for hot water systems is this company's brass gate valves; 100, 125, and 150-lb classes; non-rising stem; wedge disc. Cylindrical upper body design gives increased strength and rigidity, the same as used for high pressure steel valves. Circular available.
Page 34 Item 127

HEATING SPECIALTIES. This company's line of heating specialties was installed in Chrysler's huge automatic transmission plant, Kokomo, Ind. Items ranged from small steam traps to large heat-treating furnace. Photo shows typical installation with 4 float and thermostatic traps. Twenty-four hr delivery; 50-year durability. Bulletin available.
Page 35 Item 128

COPPER-BEARING GALVANIZED SHEETS. New Orleans City Hall, illustrated, used company's copper-bearing galvanized sheets for long-lasting, trouble-free operation. Lasts up to 33 times longer. Information available.
Page 36 Item 129

HEATING-COOLING EQUIPMENT. The 4 newest items in its line of air conditioning, refrigeration, and heating equipment are illustrated and described, including new air cooled condensers, new evaporative condensers, new hermetic refrigerating machines, and new boiler-burners. Information available.
Pages 37 thru 40 Item 130

OIL BURNER. Company's new burner fires light or heavy oils including all grades of No. 5, in capacities of 3 to 25 gph. New principle produces finest atomization yet achieved in oil burners. Built-in control panel. Information available.
Page 41 Item 131

ROLL-TYPE FILTER. This roll-type, automatic filter combines fully automatic operation and high efficiency with large dirt-holding capacity and minimum maintenance. Catalog available.
Page 42 Item 132

BOILER CONTROLS. Manufacturer offers four models in a series of water level controls for boilers up to 250 psi, providing pump control, low water fuel cut-off, and low water alarm. A complete engineering folder on its installation plus wiring sheets available.
Page 43 Item 133

SOUND CONTROL. A 5-ft sound trap replaces 80 ft of ordinary duct lining for controlling air conditioning noise. The units suppress sound in low velocity air conditioning systems and will silence an entire system or selected outlets. Information is available.
Pages 44-45 Item 134

TUNNEL CONDUIT SYSTEM. Permanent protection for underground piping is given by company's system. Ceramic pipe support blocks eliminate need for interior cast iron rest. Strong, flexible, economical, quickly installed, pipe insulation keeps dry. No maintenance required; circular available.
Page 46 Item 135

CONDENSING UNITS. This line of refrigeration and air conditioning condensing units includes the right size for every job, from ¼ through 100 hp. There are over 180 supply depots. Information, semi-hermetic and open type units available.
Page 47 Item 136

FIRE HOSE CABINETS. Shown are four types: wall recessed model that resists fumes and dust, steel cabinet size of phonograph album for smaller structures swinging hose reel with wall brackets or pipe clamps, and reel with guard combination for fast way to get full pressure in use. Catalog available.
Pages 48-49 Item 137

PACKAGED BOILERS. Photo of new 150-hp, gas-fired automatic boiler installed in Progress Laundry, Dallas, Texas, is shown. Installation reduced gas consumption more than one-third. Reasons why it pays to buy company's automatic boilers are outlined. Bulletins available.
Page 50 Item 138

DRAFTLESS DIFFUSERS. For residential, commercial or industrial installations, wherever effective controlled air diffusion is needed, there is one of this company's air diffusers to do the job better. Bulletins available.
Page 51 Item 139

ELECTRIC MOTORS. Open type or totally enclosed motors offer more for your motor dollar because they are compact, corrosion resistant, drip proof, virtually splash proof, are cooler in operation, and have longer bearing life. Bulletins available.
Page 52 Item 140

PUMPS FOR STEAM SYSTEMS. A specific type of pump for every steam heating system is offered for any standard or unusual conditions: for below-floor returns; low vacuum systems; small capacity, high pressure requirements. Details and free survey of your requirements available.
Page 54 Item 141

GALVANIZED STEEL SHEETS. Contractor on Indiana Turnpike chose this company's products for duct work and air-handling equipment because of its dependability. No make-overs due to peeling of the zinc or splitting of the sheets. Information available.
Pages 56-57 Item 142

AXIVANE FANS. Company's fans give triple economy in rolling mill motor room, where it cools a drive motor, a typical unusual application. In-line design needs no elaborate duct system. Bulletin available.
Page 58 Item 143

SOLENOID VALVES. Twenty types of solenoid valves are illustrated. There is one for every control problem. Available in sweat or pipe connections. Information available.
Page 59 Item 144

TEMPERATURE REGULATORS. There is no job too tough or too unique for the regulator manufactured by this company. One deg off, up or down, it is in operation, correcting to and maintaining the desired temperature. Information available.
Page 60 Item 145

WATER HEATING EQUIPMENT. The complete installation of this company's water heating equipment in the new buildings at St. Mary's Hospital, Knoxville, Tenn., includes convertors, storage heaters, expansion, and bulk storage tanks, 17 units in all. Catalogs available.
Page 61 Item 146

CENTRIFUGAL REFRIGERATION MACHINES. Two 300-ton machines are the heart of new air conditioning system in New Orleans Federal Office Building. Contractor selected them because they were the most flexible, easy to install, and exceeded government specifications. Information available.
Page 62 Item 147

HEATING PUMPS. Five types of heating pumps are illustrated. They all feature quiet operation, low inlet connections, and accessibility for inspection. A pump is available for each and every heating requirement. Bulletins available.
Page 63 Item 148

STEEL PIPE. Architects specified this company's steel pipe for attractive service building, parts of which are under construction on the campus of Cleveland's John Carroll University. Information available.
Page 64 Item 149

AUTOMATIC HEATING. A single, dependable source supplies steam generators, oil and gas burners, preheaters, heating systems, oil pumps, draft adjusters and a complete line of accessories. Bulletins available.
Page 65 Item 150

AIR CONDITIONING CONTROLS. Indoor-outdoor control system incorporates thermally sensitive resistors called thermistors. A new concept in temperature control, system automatically raises indoor temperature as outdoor temperature drops. Bulletin available.
Page 66 Item 151

BALL BEARINGS. The interest of the consumer was served by using this company's super-quiet, permanently lubricated pillow block installed in condenser units and fan, eliminating troublesome servicing problems and operating at a whisper. Bulletin available.
Page 67 Item 152

HIGH VELOCITY UNITS. All-air constant volume high velocity mixer-diffuser units deliver constant volume always. Capacities can be pre-set at factory. Selection Manual available.
Page 68 Item 153

BOILERS. Improved efficiency and lower operating cost were noted by Hillside, Ill., Consumers Co. after installation of four of this company's boilers to supply steam in volume at low cost. Five thousand tons of sand are heated with steam for warm, ready-mixed concrete construction application. Details available.
Page 69 Item 154

Postage Will be paid by Addressee

No Postage Stamp Necessary If Mailed in the U. S.

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

AIR CONDITIONING, HEATING AND VENTILATING
93 WORTH STREET
NEW YORK 13, N. Y.

AD-DIGEST SERVICE

Ad-Digest

BOILER FOR HIGH TEMPERATURE WATER. The arguments for high temperature water systems for heating or processing are outlined in this advertisement. Company's controlled circulation hot water boiler is illustrated and its advantages are outlined. A new catalog is available.
Page 70 Item 155

FILTER DRYERS. These full flow units are installed in the main liquid line for refrigeration application up to 100 tons of refrigerant-12. System stays clean dry and acid free. Information available.
Page 71 Item 156

COOLING TOWERS. This company's centrifugal fan cooling towers maintain an even flow through short or long duct work where higher resistance is normally a problem. This makes them particularly suitable for indoor use. Bulletin available.
Page 125 Item 157

ZINC-COATED STEEL. No matter how tough the applicating job, zinc coating stays put. Production problems are simplified and some important cost savings are made at the same time. Booklet is available.
Page 127 Item 158

REFRIGERATION COMPRESSORS. Faith, the most important material of all, is going into this company's new Sidney plant. Faith in the company, in the quality of its products, in the future of the industry, and in the system of free enterprise.
Page 129 Item 159

AIR-COOLED CONDITIONERS. Improved, packaged, waterless, air-cooled air conditioning unit has aluminum shell that is light and rust-proof, color finish that will not peel or chip and requires no maintenance, and is covered by 5-yr guarantee. Information available.
Page 131 Item 160

HEAT-TRANSFER TUBING. Electric-resistance-welded carbon steel heat exchanger and condenser tubing has optimum heat transfer ability because of uniform wall thickness. Easy to bend, coil, swage, and roll into tube sheets. Bulletin available.
Page 133 Item 161

EXPANSION JOINTS. This company's expansion joints will do a better job because they incur less heat loss, less pressure drop, take up less space and cost less. Available in packless or slip-type design. Bulletins available.
Page 135 Item 162

UNFIRED PRESSURE VESSELS AND STORAGE TANKS. Company has broken what it calls life quality price barriers, combining its 50 years in the business with ten years of developing a complete line of linings, so that vessels give complete corrosion protection available heretofore only with expensive alloys and clads.
Page 137 Item 163

LIQUID COOLER PACKAGE. A liquid-cooling package is offered for more efficient performance and easier installation. Capacity ranges from 7½ to 100 tons. Also available are a full range of air conditioning and refrigeration components. Complete file of literature offered.
Page 139 Item 164

AIR DIFFUSERS. Square and rectangular air diffusers are equipped with built-in diffusing vanes arranged in unlimited louver patterns. A catalog showing how to select the proper size and pattern is offered.
Page 140 Item 165

DATA ON CONDITIONING UNITS. A 52-page data book is offered with specifications and physical data on central station air conditioning units. The book includes coil data, psychrometric chart, selection data, temperature charts and tables, and fan information.
Page 141 Item 166

COOLING TOWERS. Forced draft cooling towers operate without fan. No moving parts; lower cost, though attractive and compact. Match air conditioners' 3 to 25 tons. Information available.
Page 142 Item 167

FAN-COIL UNITS. Five major economy considerations compel the choice of this firm's fan-coil conditioners: quiet operation, lower maintenance, faster installation, easier filter change, and easier recessing. Bulletin available.
Page 143 Item 168

HIGH EFFICIENCY CONDENSERS. In size ranges from 100 to 450 tons of refrigeration, these condensers operate at full capacities because pre-cooling coils remove the superheat and bring about condensing at low temperatures. Complete information is contained in bulletins available.
Page 144 Item 169

COPPER-BRASS TUBE. Since every facility of this company is concentrated on the production only of tubing, you are assured of the exact tube you want, in the exact quantity you want, and exactly when you want it.
Page 145 Item 170

UNIT HEATERS. One unit heater of clover leaf design does the work of two or more conventional heaters. Variable 4-way air distribution heats up to 8000 sq ft of floor area. For steam or hot water they come in 8 sizes, 55,000 to 600,000 Btu per hr. Information available.
Page 146 Item 171

WATER VENTS. Five water vents are illustrated and described by manufacturer of water system specialties. Air is vented automatically from hot and chilled water systems with pressures up to 150 psi. For residential, industrial, process applications. Catalog available.
Page 147 Item 172

INDICATORS AND GAGES. Manufacturer features instruments for liquid depth measurement and remote indication of specific gravity. Two bulletins are available.
Page 148 Item 173

AIR CONDITIONING APPARATUS. Two-bedroom apartments in Houston's La Fonda development rent for 135 dollars because they're air conditioned with this company's equipment: 3 packaged chilled water systems totaling 390 tons capacity. Information available.
Page 149 Item 174

GAS UNIT HEATERS. Initial cost of this company's gas unit heaters are low. There are no registers or radiators, no expensive piping or duct work to buy. Each heater operates independently. Catalog is available.
Page 150 Item 175

MOTOR PUMPS FOR AIR CONDITIONING. Utilization of this company's motor pumps in an air conditioning system is a good sales point because they will recognize the brand name. Pumps vary in sizes from ¼ to 75 hp.
Page 151 Item 176

STEAM TRAPS. Inverted bucket, combination bucket and thermostatic, thermostatic, and float traps are illustrated and described. Information on all of these types is available. Each trap has its own purpose; correct selection is urged.
Page 152 Item 177

COMPLETE FIRING SYSTEM. Engineered as a unit and installed as a unit, a complete firing system is available for oil, gas, or oil-gas combination. Accurate control of all firing functions is featured. Hundreds of this company's dealers are located in all parts of the United States and Canada for prompt service. Information available.
Page 153 Item 178

PUMPS. The right answer to most pumping problems is available in one of the pumps produced by this company. Included are horizontal and vertical centrifugal pumps, sump pumps, air conditioning pumps, sewage pumps, high ressure pumps and boiler feed pumps. Bulletins available.
Page 154 Item 179

PRODUCT COOLERS. Company's glycol defrost product coolers maintain various temperatures down to —30 deg F, yet require defrosting for only 30 minutes once a day. Patented inner-fin construction. Catalog containing complete information available.
Page 155 Item 180

GLASS FIBER INSULATIONS. As at world's largest shopping center, Gulfgate Shopping City, Houston, Tex., the first call is for this company's glass fiber insulations: noise-deadening duct liner, thermally-efficient, tough duct insulation, and a snap-on one-piece pipe insulation in 3-ft sections.
Pages 156-157 Item 181

NEW GATE VALVE. Without removing valve body from the line, nickel alloy seat rings in patented renewable heat ring gate valves are replaced in 7 to 10 minutes from the time the line is shut down until it is put back into operation. Illustrated descriptive folder available.
Page 158 Item 182

WATER CHILLERS. Factory assembled chillers are complete with automatic controls, non-ferrous chilled water circuits, and come in 1000 combinations to cover the 2- to 120-ton range. ASME-approved components. Information available.
Page 159 Item 183

FUEL OIL HEATER. Presented is a safety barrier fuel oil heater that really delivers hot oil. Has 100% true counterflow, a safety barrier that eliminates need for electric warning systems, extended tube surface and has no electric wiring. Bulletin available.
Page 160 Item 184

VALVES. Shown is application of this company's valves in new 18-acre Sikorsky plant. Valves are shown controlling heating line. Used throughout plant on steam, water, air, and process piping. Valves were chosen because they are reliable. Used for 93 years, these valves cost no more. Information is available.
Page 161 Item 185

PACKAGED CHILLER. The space saving advantages in patented, inner fin all copper construction of company's packaged chiller resulted in its sale to El Rancho Motel, Hot Springs, Ark. They are easy to handle and easy to install. Available in 2 to 100 hp models. Catalog available.
Page 162 Item 186

THERMAL, SONIC INSULATION. Fiber glass insulation is shown being applied to heaters, guaranteeing heater efficiency above 80%. Of constant resiliency, insulation material will not irritate skin of those who handle it. Ideal for sound deadening, too. Information available.
Page 163 Item 187

EXHAUST HOSE. Made of strong neoprene coated cotton or nylon fabrics spiral wire reinforced, hose is installed for dust control, particularly for elbows and moving hoods. Information available.
Page 164 Item 188

Ad-Digest

CENTRALIZED CONTROLS. System, illustrated, provides visual supervision of entire heating and air conditioning plus other mechanical or electrical functions; provides automatic control; and reduces installation and operation costs. Eight page brochure gives all details.
Page 165 Item 189

SUBMERSIBLE PUMPS. Hundreds of applications are possible because of pump's amazing capacity, compactness, low center of gravity, portability, and submersible features. Among them are: basement sump pump, coolant circulation, in septic tanks. Up to 5000 gph. Information available.
Page 166 Item 190

FIXED AIR GAPS. Water contamination is prevented by the installation of this company's fixed air gaps eliminating direct connections between water lines and sewers. Available in two designs, one with tapped inlet, tapped or spigot outlet, and one in standard length with tapped inlet and outlet. Catalog available.
Page 166 Item 191

SPRAY NOZZLES. Spray nozzles for evaporative roof cooling reduce indoor temperatures on hot sunny days 10 to 20 deg. Choice of nozzles includes non-clogging and water-saving models. Bulletin on roof cooling available.
Page 166 Item 192

AIR-COOLED CONDENSER. Company's air-cooled condenser plus year-round automatic head pressure control guarantees maximum pressure at expansion valve in winter, maximum summer capacity, prompt defrosting, immediate compressor start-up. Bulletin available.
Page 167 Item 193

VELOMETER. Velometer measures actual air delivery. Simple, direct reading gives instant measurement in any distribution system. Compact, portable, easy to understand and to use. Bulletin available.
Page 168 Item 194

ELECTRIC AIR DUCT HEATERS. Forced air temperatures to 1050 deg F are accurately maintained with electric duct heaters. An efficient, economical answer to heating air or gases under forced circulation. Bulletin available.
Page 168 Item 195

YEAR-ROUND CONDITIONING. Woodlane apartments, comprising 18 buildings and covering 4 city blocks were air conditioned with this company's equipment. Dallas, Texas, apartments are illustrated. Four compressors furnish 400 tons refrigeration. Information available.
Page 169 Item 196

FURNACES. Four series of furnaces are illustrated: heavy-duty models for industrial and commercial heating, gas-fired suspended types, oil-fired suspended types, and a direct-fired series, the last in capacities to 2,000,000 Btu.
Page 170 Item 197

GAS OR OIL BURNERS. These gas or oil burners combine low installation and maintenance costs with added years of dependable service. Information is available.
Page 170 Item 198

VANEAXIAL BLOWERS. Blowers last longer, do a better job, have long life, rugged reliability and maximum maintenance. Heavy-gage steel is used throughout. All units rated according to standard test code. Top quality motors supplied. Information available.
Page 171 Item 199

AIR FILTER GAGES. Three types of air filter gages are illustrated and described. Each is a high-precision instrument built for a lifetime of service, for public buildings, hotels, hospitals, and office buildings. Bulletin available.
Page 172 Item 200

CONDENSATE PUMPS. Unusually compact, they fit inside any unit and assure positive priming over long distances and high lifts at a fraction of the cost of gravity lines. Data available.
Page 172 Item 201

POWER EXHAUSTER. The world's most efficient power exhauster, for industry, institutions, or residences, has no motor, fan, or bearing in exhaust line; needs no stacks; and has acid-resisting vitrous enamel finish. Engineering data available.
Page 172 Item 202

DRAFT CONTROLS. Draft controls for coal and oil-fired heating plants are heavy-duty, commercial models in 28- and 32-in. sizes. They are also available in 6- to 24-in. sizes for domestic and commercial installations. Controls for gas and gas-oil fired heating plants are also made in sizes 8- through 32-in. Information is available.
Page 173 Item 203

PRESSURE GAGE. The unique design of this pressure gage guarantees it cannot be harmed by sudden pressure surges, shock loading, or severe vibration. It is sensitive to pressure, pressure differentials, or vacuum. Bulletin is available.
Page 174 Item 204

FLOATS. Company is prepared to solve liquid level control problems involving floats and provides complete technical data on types, sizes and suitable metals for floats, depending on conditions. Made in a variety of metals in sizes from 2½ to 14 inches. Catalog available.
Page 174 Item 205

RADIANT-ACOUSTICAL CEILING. Economy is now possible with this integrated radiant acoustical ceiling. All radiant duct, aluminum acoustical panels, diffuser panels and framing for recessed fixtures are supplied. Booklet available.
Page 174 Item 206

SCHOOL HEATING, VENTILATING. The economical answer to class-room comfort, a gas-fired schoolroom heating and ventilating system, is offered in one complete package: perimeter forced air, automatic operation, proper mixture of outdoor air. Specifications available.
Page 175 Item 207

POSITIVE SEALING INDICATOR. The ideal low-cost indicator for hard-to-get-at places, new liquid eye positive sealing indicator is more compact, completely self-contained, available with 2 or 3 viewing ports. Catalog available.
Page 176 Item 208

ALL-ALUMINUM VENTILATORS. Direct drive and belt driven ventilators of all-aluminum construction are offered. Low silhouette design in both. Light starting torque increases bearing motor life. Catalog available.
Page 178 Item 209

REGISTERS AND GRILLES. Four items from its catalog of registers and grilles are illustrated; a baseboard diffuser, a baseboard register, a perimeter floor register, and a ceiling air diffuser. You are urged to send for the new edition.
Page 179 Item 210

DESIGNERS WANTED. Many opportunities for men who want to grow in engineering through broader assignments are outlined in advertisement. Whether mechanical, steam power, or heating and ventilating is your field, company urges you to send complete resume.
Page 180 Item 211

CENTRIFUGAL ROOF VENTILATOR. Manufacturer's centrifugal roof ventilator is developed and manufactured with applied centrifugal blower principles. Machines feature quietness, adaptability, efficiency and sturdiness. Bulletin is available.
Page 181 Item 212

SELF-CONTAINED CONDITIONERS. Model illustrated has 7½ ton capacity, requires only water and power connections. For commercial and larger home air conditioning. Direct air discharge and intake eliminates need for ducts. Line starts with ¾ tons. Data available.
Page 182 Item 213

FANS. Metal blade fans last longer and cost less. From 54 inches to 22 ft for cooling tower and radiator-type coolers, efficiency, economy and durability are promised. New metal blade with true air-foil sections give maximum air delivery. Information available.
Page 182 Item 214

CAST IRON GAS BOILERS. Gas-fired model illustrated is very easy to install, designed for long life with minimum repairs and maintenance, and requires less floor space and head room. From 625,000 to 5 million Btu input. Literature available.
Page 183 Item 215

CENTRIFUGAL ROOF EXHAUSTERS. This company's Lo-Boy centrifugal roof exhausters enhance the beauty of building skylines. Forward or backward curve wheel within or out of scroll housing. Bulletin available.
Page 184 Item 216

GAS BURNERS. This line is recommended when you have a job that calls for a forced-draft gas burner. Illustrated is one with a capacity of 100,000 to 5,400,000 Btu per hr. It comes in 7 sizes. Features include non-pulsating flame and explosion-free circuit. Bulletin available.
Page 184 Item 217

MOTORS FOR AIR CONDITIONING. Commercial air conditioning installations use these quiet motors to avoid resonance or hum induced in the system by the drive motor. Every bearing noise tested. Housing resonance-free. Information available.
Page 185 Item 218

VIBRATION CONTROL. The manufacturer's complete line of products provides an answer to any installation, vibration, and noise problem. Bulletin is available.
Page 186 Item 219

TWO-STAGE CONTROL. Dual purpose controls, for pressure or temperature, incorporate a single element that operates two separate, independently adjustable, magnetic mercury switches. Sample circuit arrangement described. Bulletin available.
Page 186 Item 220

SUBMERSIBLE SUMP PUMP. Built for automatic submerged operation, packaged unit will operate under water, easily installed in sump 2 to 8 ft deep for gas-tight and flood-proof operation. Choice of three controls. Information available.
Page 187 Item 221

AIR VENTS. Five vents are illustrated. The right one in the right spot has, over the years, worked miracles in clearing up malfunctioning systems, eliminating spotty and erratic conditions that expensive alterations in vacuum or steam layout had not cured. Catalog available.
Page 188 Item 222

SPRAYED COIL UNITS. The contractors chose this company's units for the air conditioning system of the Dime Savings Bank of Brooklyn. They withstand corrosion and assure minimum maintenance because of copper coil construction and plastic sprayed piping and nozzles. 24-page catalog available.
Inside Back Cover Item 223

YEAR-ROUND PNEUMATIC CONTROL. The world's first circular office building, Hollywood home of Capitol Records, is furnished with this company's pneumatic control. Its capabilities are described. Information available.
Back Cover Item 224

LOUIS BLENDERMANN ON

PIPING AND PLUMBING

Sub-Surface Water Conditions

NUMEROUS buildings are being erected throughout the country, and it is reasonable to expect that some of the structures will be built in areas where sub-surface or ground water conditions exist. Space is at such a premium in many of our cities that in order to erect a building within a certain area of the city, it may be necessary to utilize a plot of ground where ground water conditions exist. When this situation is encountered, careful attention must be given to the installation of an underground plumbing drainage system.

Let us assume that a building of say 15 stories is to be erected in a section where ground water is prevalent. In this case we shall concern ourselves only with the refinements in design that must be considered for that

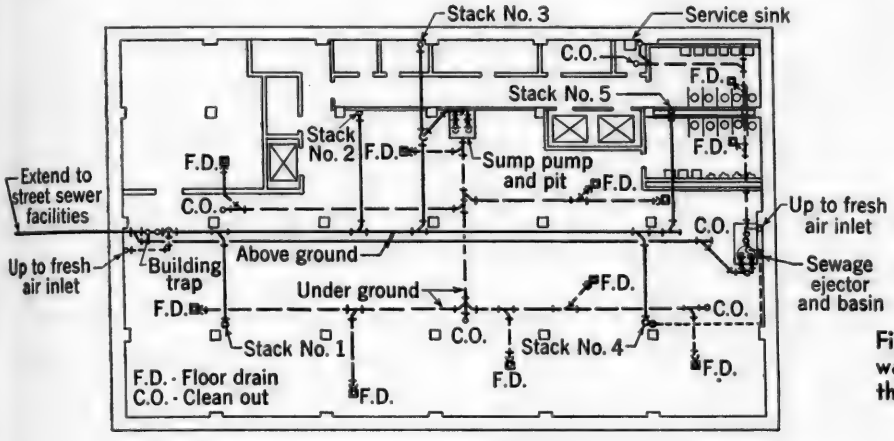


Fig. 1. Arrangement of soil and waste piping that are required at this floor level in a multi-story building.

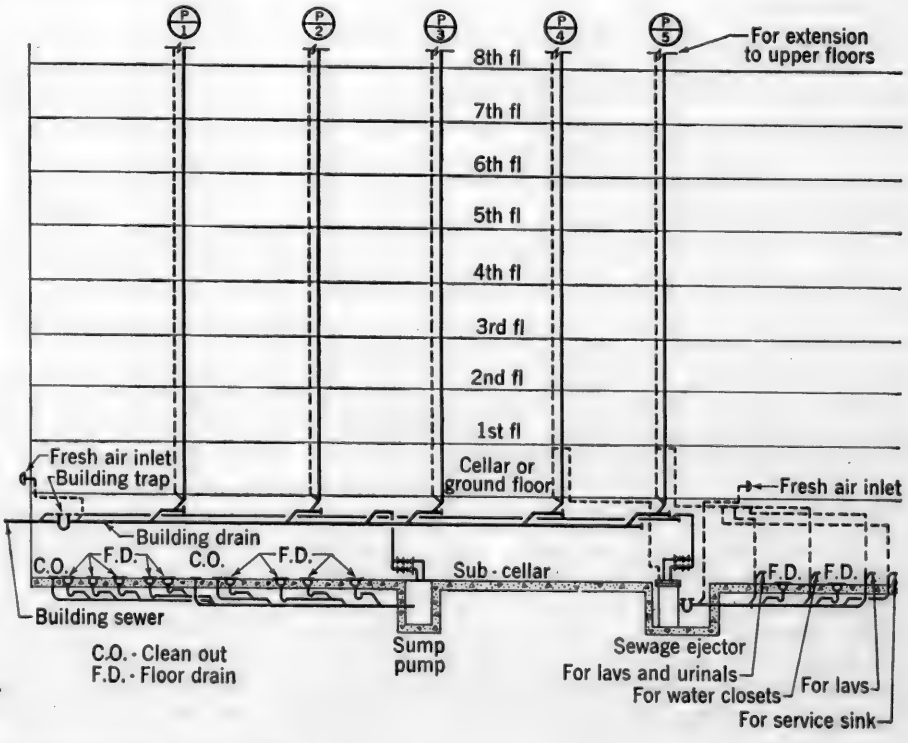


Fig. 2. Diagrammatic arrangement of soil and waste piping.

portion of the plumbing system and fixtures located at the lowest floor level in the building. Figure 1 shows a typical plumbing system as may be found at the low level in the building which we shall call the sub-cellar.

In Fig. 1, certain toilet room fixtures, as well as a system of floor drains, are located at the sub-cellar level. A typical arrangement of the underground drainage piping, in addition to the gravity drainage system, is illustrated. The sump pump and sewage ejector are also spotted on the plan. That part of the drainage system that is installed above the floor is represented in Fig. 1 by the heavy solid lines. The broken lines signify that part of the drainage system installed underground. Using this as a key plan, components of the underground piping and equipment will be described and the manner in which this part of the system is installed.

Arrangement of Piping, Fixtures and Equipment

In order to show how the piping of Fig. 1 appears in elevation, Fig. 2 is used.

Floor drains at the sub-cellar level receiving waste from mechanical equipment and floor surface discharge into the sump pit while the waste from the plumbing fixtures is discharged into the sewage ejector. The sump pump lifts the waste and allows it to discharge into the building drain. The sewage ejector lifts the waste and conducts it to the street side of the building trap on the building drain line.

Both a fresh air inlet and a vent connection are installed at the sewage ejector to satisfy maximum code requirements. In this regard, it is always good practice to check with local plumbing authorities in a specific area for their requirements. The five plumbing stacks illustrated in Fig. 2 are included for the purpose of example only. For the sake of clarity, water, the leader and other plumbing systems normally required in a building of this type are not shown.

Waterproofing

Since ground water conditions, in the form of a high ground water table, springs or any other circumstances that creates water problems, exists at the site, measures must be taken to render watertight both the floor slab and building walls in the sub-cellar. In this instance, the foundation engiener must waterproof the floor slab and the foundation walls.

There are a number of methods that can be employed to accomplish this. For example, in this case, we shall assume that a single floor slab of considerable thickness will be used. A finish coat of waterproofing will be applied to both the floor slab and the walls to ensure dry and watertight conditions. What then are the phases of plumbing design that should be given adequate attention? The details that follow will cover some of the refinements that should be considered.

Underground Drainage Piping

The installation of underground drainage piping presents somewhat of a problem where ground water conditions exist. This piping must be carefully installed since, once it is in place, it is not accessible. Therefore every precaution must be taken to insure proper installation and support. Assuming that a floor slab of approximately 18 in. thickness is used, the underground piping

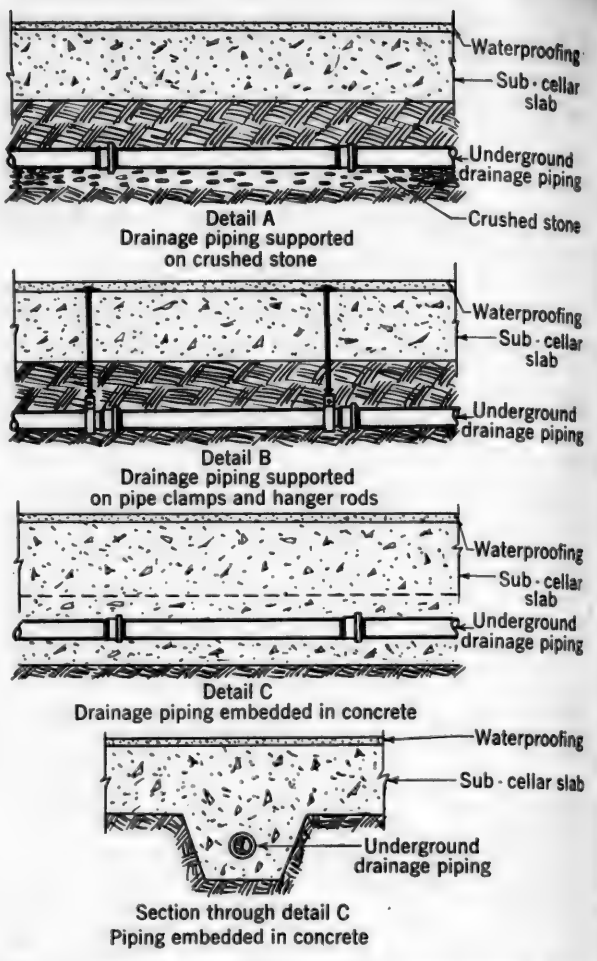


Fig. 3. Several methods for installing underground drainage piping.

can be supported in one of several ways as illustrated in Fig. 3.

Detail *A*, in Fig. 3, shows the application of crushed stone. The crushed stone is placed under the piping as a support. It effectively distributes the weight of the piping and will in general prevent the piping from sagging regardless of the poor stability of the soil due to water conditions.

Detail *B* shows how the underground piping can be supported from the slab itself. The piping is installed with the pipe clamp attached and the hanger rod extending in an upright position. After the floor slab is poured, steel plates are placed over the hanger rod and rigidly secured in place. The layer of waterproof finish will conceal the steel plates.

Detail *C* illustrates how the piping is installed in a trench that is to be entirely encased in concrete when the floor slab is poured. The section through Detail *C* shows the trench and how the piping is encased in the concrete. Reinforcing rods hold the entire concrete mass together. The decision of just which method will be most suitable, rests with the engineer and the foundation consultant. In this article, it is assumed that the method of support shown in Detail *C* is being used.

Floor and funnel drains are necessary components of the drainage system. The floor drains are required to intercept any water that may accumulate on the floor

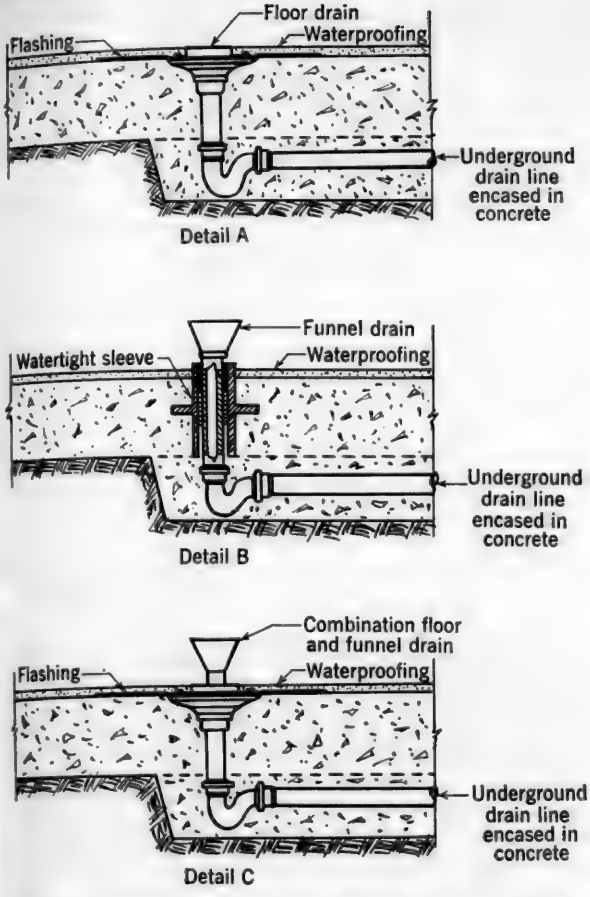


Fig. 4. Suggested methods for installing floor and funnel drains.

while the funnel drains are needed for the various mechanical equipment from which waste or cooling water is discharged. Both types of drains can be installed in a watertight manner as shown in Fig. 4.

Floor drains can be installed in a watertight manner with the method suggested by Detail *A*, Fig. 4. In this instance, copper or lead flashing is clamped into the drain as shown to prevent any seepage of water out from around the perimeter of the drain itself.

Funnel drains can be installed as indicated by Detail *B*. Here, a watertight sleeve is employed. The sleeve is then packed with oakum and lead or mastic compound. The sleeve is easily fabricated on the site and can be counted upon to prevent water seepage.

A very popular drain is the combination floor and funnel drain. This unit not only serves to receive the waste from equipment but also functions as a floor drain. Detail *C* shows how a drain of this type can be installed in a waterproof way, with copper or lead flashing.

Soil and Waste Pipe Penetrations

Soil and waste lines serving the plumbing fixtures should also be given some attention at the point where the lines penetrate the floor slab. Figure 5 represents typical soil and waste line penetration.

Detail *A* of Fig. 5 shows the installation of a waste line while Detail *B* portrays the installation of a soil line. Both installations, in this particular case, were accomplished without the use of watertight sleeves or flashing fittings. The reason is that, when the underground drainage line is included within the slab, or is encased in concrete as shown in both details, then it often is not necessary to provide any special devices. This is especially true when waterproofing liquid is mixed with the concrete used for the floor slab.

If, however, the waterproofing liquid is not used, and it is desired to have the positive protection of watertight devices, then either sleeves or flashing fittings can be used with the lines penetrating the floor slab.

Sewage Ejectors

Since a certain number of plumbing fixtures are required in the sub-cellar floor level, a sewage ejector is needed. The waste matter flows into the ejector basin from which it is pumped to a higher elevation and into the building drain on the street side of the building trap. From here it discharges by gravity to the outside street sewer facilities. A typical ejector installation might be somewhat similar to that shown in Fig. 6, where a pit has been provided to receive the ejector basin.

The pit interior is waterproofed as is the surface of the floor slab. Watertight sleeves are installed for the drainage piping that penetrates the side of the pit. Sand is placed around the basin to keep vibration of the basin to a minimum when the pump operates. The ejector basin is used for two reasons: (1) it simplifies the installation since the basin can be set in place after the concrete work and the waterproofing are accomplished; (2) since the basin affords tighter connections than just the pit and cover there is less possibility of odors.

The installation of piping and equipment, as offered

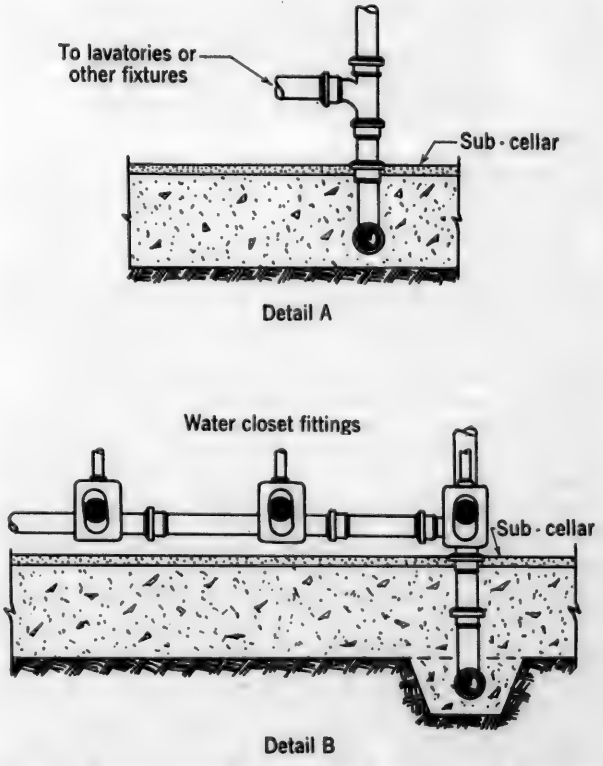


Fig. 5. Typical installation of soil and waste lines for sub-cellar fixtures.

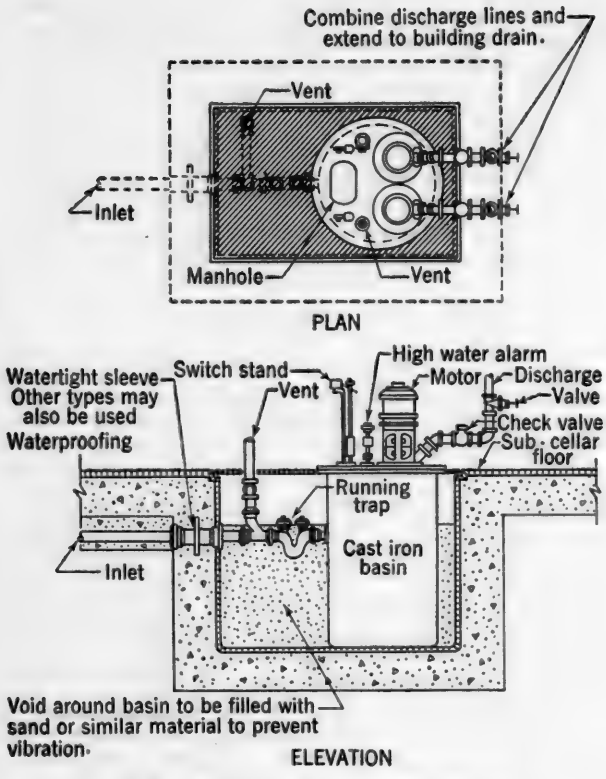


Fig. 6. Installation of a sewage injector.

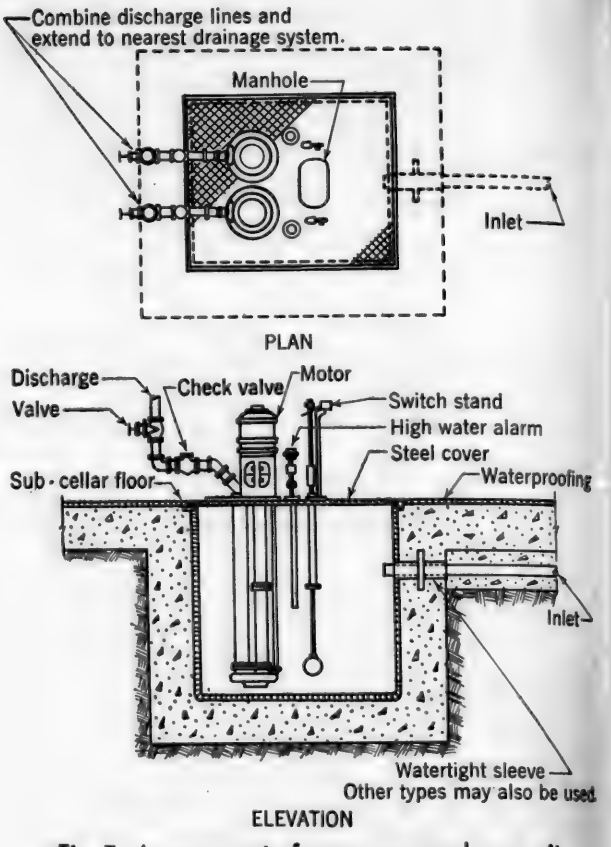


Fig. 7. Arrangement of sump pump and sump pit.

by Fig. 6, reflects maximum code requirements. Local plumbing authorities should always be consulted for their particular regulation governing the installation of a sewage ejector. The checkered plate cover over the pit itself should be thick enough to withstand the weight loads imposed. In addition it should be braced sufficiently to form a snug fit around the basin as well as at the sides of the pit.

Sump Pump

A sump pit is provided to receive the waste water from the floor and funnel drains. A typical installation of the sump pit and pump is shown in Fig. 7.

As noted in Fig. 7, a concrete pit is constructed to receive the flow of waste water. Waterproofing is applied to the interior of the pit as well as to the surface of the floor slab. The sump pump lifts the waste water to an elevation high enough for it to drain by gravity into the building drain. In this instance a cast iron basin is not needed because the waste water is relatively clean and does not present the odor problem as does the soil line waste.

On occasion, the foundation engineer may wish to have the sump pit receive the ground water when it exceeds a certain level. This practice will reduce the possibility of the water exerting pressure on the underside of the slab. To do this, slots are furnished through one side of the pit. Both the pit and pumps must be sized to a capacity that is adequate to receive the quantity of water expected. The foundation engineer should be able to supply the necessary data concerning the rate of flow.

When these slots are included, it is well to remember that some emergency means of auxiliary power must be considered in the event of an electrical power failure. Otherwise, if the electrical power should fail, the water would not only flood the sub-cellar but would also damage much of the mechanical and electrical equipment contained at the sub-cellar floor level. Another method entails the placement of pipes in the side of the pit. Valves with operating stems that extend through the cover of the pit are placed on the pipes. When the danger of power failure occurs, it is easy to close the valves until the impending emergency is past.

Of course, when emergency power is included in the building for lighting as well as the operation of certain

(*Concluded on page* 144)

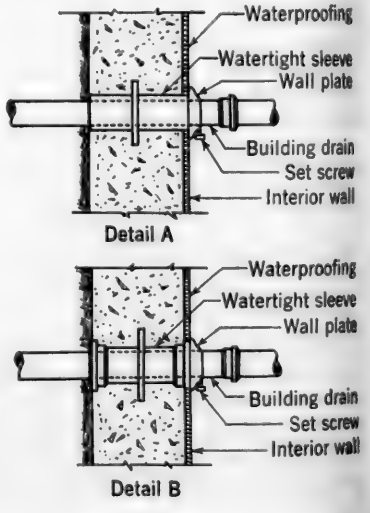


Fig. 8. Watertight sleeves for drainage lines penetrating a building wall.

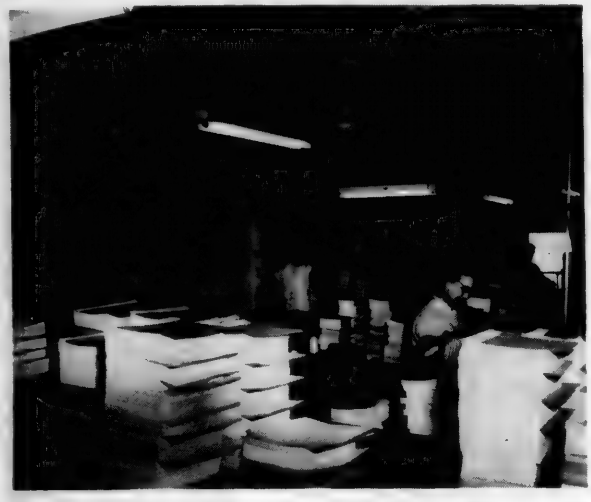
PRODUCT APPLICATIONS

New, Unusual, or Ingenious Uses of Equipment and Materials

Cincinnati Bindery's Vertical Fan Disturbs Not Leaves or Hairdos

PROBLEM: Where workers engage in delicate paperwork, as in the Art Guild Bindery Co., Cincinnati, Ohio, horizontal drafts are most irksome. Thousands of unbound books lie exposed.

Small fans had been installed under benches to provide air circulation. These were numerous and hazardous.
SOLUTION: Suspended vertical fans were installed. Blades rotate in a horizontal plane, approximately 8 ft above the floor, directing the air upwards and outwards in a circulation pattern resembling a huge donut. Vertical



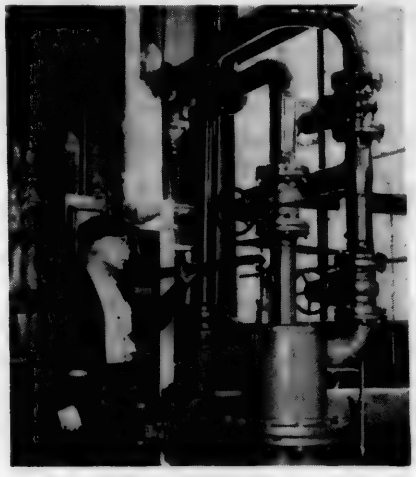
Breeze unit illustrated, product of Norky Mfg. Corp., Covington, Ky., induces a high air volume per cu ft of space in lower room levels, breaking up the usual stratification of air and providing draftless circulation with vertical air currents. One fan recirculates 13,000 cfm, induces a vertical 80 fpm in lower room levels, serving 12 to 15 hundred sq ft of floor space.
RESULT: Not only do book leaves remain undisturbed, but the women employees find their hair-dos undisturbed. The management had tried one fan, was satisfied, and equipped their entire shop with this type unit.

Use of Direct Expansion Liquid Chiller Doubles Supply of Dry Air

PROBLEM: Production of refrigeration compressors and condensing units at the manufacturing plant of Tecumseh Products Co., Tecumseh, Mich., had to be closed down, often for three or four days at a time, when summer's high humidity overloaded its supply system supplying dehydrated air for drying its refrigeration components.

The system originally in use worked in this manner: Air was heated from room temperature to 310 deg F in a series of large dryers. Raising the air to this temperature reduced its relative humidity to the desired point. The excess moisture picked up was then removed by passing it through a series of deep refrigeration coils, where it condensed out.

While additional dryers might have been purchased, the length and frequency of the peak humid periods did not justify the cost. Also, the equipment would have taken up valuable factory space.
SOLUTION: An Acme Dry-Ex direct expansion chiller, from Acme Industries, Inc., Jackson, Mich., normally



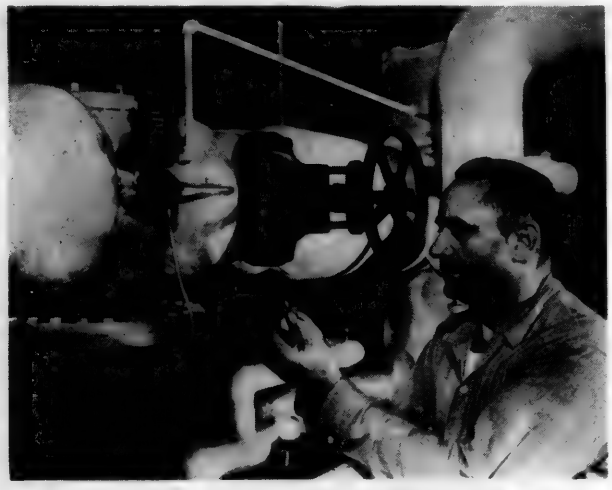
used to cool liquids, was placed in the line directly ahead of the air dryer. (Chiller is horizontal unit in picture, lower right)

In the new cycle of operation, room air is drawn into the system and heated to 110 deg by heat of compression of an air compressor. It is then passed through the direct expansion chiller, under pressure, and cooled to a temperature of 60 deg. Still under pressure, air enters the large drier, to emerge at 310 deg with the desired low moisture content. The water removed in the condensing operation is removed from both chiller and drier by a special bleed-off valve.
RESULTS: The air-drying process now employed requires approximately one ton of refrigeration capacity for each 100 cu ft of air passing through the chiller. With three 7½-hp systems with a capacity of 750 cfm, one 14-ton system, 1,700 cfm, and one 20-hp system, 1,900 cfm, capacity is doubled.

Flexible Handling of Purchased Steam Achieved with Regulators in Parallel

In the basement of the Socony-Mobil Building, New York City, a well-planned regulator station controls flow

of purchased steam for heating, air conditioning, and refrigeration. In the entire building, 22 regulators from 2½ to 6 inches are used. They are accessible for inspection, repair, and maintenance, as illustrated.



Three regulators in parallel of different size in the station shown permit flexibility in handling varying demands for steam. Each regulator, product of Spence Engineering Co., Walden, N. Y., has a strainer, pressure gage, and by-pass.

Steam is reduced in pressure at the various stations in the building from 55 to 20 psi; 20 to 5 psi; 17 to 12 psi; and 17 to 5 psi.

Main regulators can be inspected without removing from the steam line by taking off top flange. Pilot valves are external to main regulator for easy inspection and replacement, if necessary. Exterior wall behind steam mains has fiberglas insulation with a covering of sheet aluminum.

Stacks Fifteen Feet Above Laboratory Roof Vent Soaking Tanks for Dirty Engines

An unusual looking installation of centrifugal blowers is located at the Gulf Research Center, Harmarville, Pa.

Blowers are applied to exhausting flammable and other harmful vapors from the cleaning room of the New Automotive Products Evaluation Laboratory recently

completed. The cleaning room has four soaking tanks and two spray booths, each equipped with its own fume exhauster. The soaking tanks are filled with solvents for loosening deposits on dirty engine parts after they've been tested. Each tank is filled with long slots along the fronts and sides, through which vapor-laden air is drawn into a duct through the blowers on the roof, and then discharged into the atmosphere with vent stacks 15 ft. above the roof to assure proper dilution and dispersion.

A static pressure regulator in the supply air duct automatically throttles the air intake damper on the supply fan to provide tempered air in the correct quantity required in accordance with the number of blowers in operation.

The complete blower and duct work system was installed by Morgan Brothers Co. on subcontract for Langdon-Kaschub, the heating and ventilating subcontractor, Pittsburgh. Blowers were made by The Peerless Electric Co., Warren, Ohio.

Two-Temperature Chilled Water Serves Color Processing

PROBLEM: Two trips per day to the icehouse, plus cracking ice by hand, proved too impractical for Gibbons Color Processing Laboratories, Los Angeles, Calif., who needed a water supply constantly tempered to workable developing level. Firm, a color processing source for West Coast professional photographers and graphics arts advertisers, handles two types of film. One requires 60 deg F temperature. The other, 75 deg. To achieve true color response a plus or minus ½ deg temperature is allowable. Therefore, to prevent frilling, fool-proof mechanical steps had to be taken to reduce summer water temperature which averages from 80 to 85 deg.

SOLUTION: Self-contained, fully packaged water chiller, a 3-ton air-cooled model, manufactured by Drayer-Hanson, Inc., Div. of National-U. S. Radiator Corp., Los Angeles, was installed. Decorator cabinet, requiring less than 4 sq ft of floor area, sets adjacent to work area and controls wash water. Substantial savings are effected by utilizing waste wash water in tank to maintain correct temperature of actual developing solutions. Valves mix hydrant water with chiller water to maintain desired temperature. Chiller requires no condenser water, is equipped with vertical top discharge.

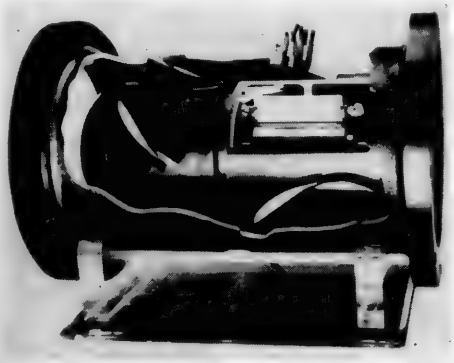
RESULT: Makeshift methods to cool water are eliminated. There are no material losses due to mechanical difference. Chiller is in full use during winter months when ambient temperature of room offsets tank temperatures.

NEWS OF EQUIPMENT AND MATERIALS

Use the convenient prepaid postcard appearing on page 105 for securing additional information on new equipment and materials described in this department.

New Blower Ultra-Quiet

An ultra-quiet vaneaxial blower with a unique slotted airfoil is now being installed in nuclear powered submarines and will soon be available from Electric Boat Div., General Dynamics Corp., Groton, Conn., for air conditioning and ventilation of everything from atomic power plants to hospitals, the company states.



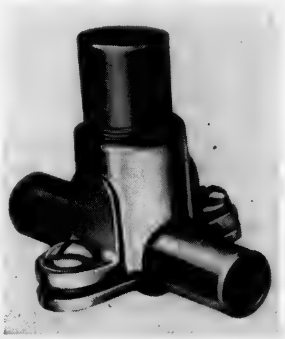
Blower is the result of a three year program to devise the smallest and quietest fan ever built for the compact confines of submarines, where there is no room for bulky or noisy equipment. With wheel of 15.5-inch dia, revolving at 1750 rpm in space envelope of 3.6 cu ft, a 115-lb, 1.5-hp fan has 84% efficiency and minimum airborne noise of 69 db.

The fan uses the aerodynamic principle of boundary layer control to achieve quietness with small size and high efficiency. Application of slotted airfoils in fan design is said to be unique in the air conditioning and ventilation industry. Quietness is extremely important for submarines, dependent on silence to escape detection.

More information? Circle Item 1 on postcard, page 105.

Saddle Tee for Copper Tubing

A new model brass saddle tee for quick connections on 5/8-inch OD copper tubing to provide a 1/2-inch FPT outlet is manufactured by Sall Bros. Co., Rockford, Ill. This tee will supplement the popular Model 25 saddle tee used on 1/2 and 3/4-inch iron pipe.



The new tee, designated Model 25C, is a heavy brass casting, machined to saddle 5/8-inch OD copper tubing or pipe and is attached with a plated steel clamp bracket, the two parts being held firmly in place by plated steel screws. A Neoprene washer placed between the casting and the tubing provides a leakproof seal impervious to most liquids and gases. The steel bracket is dimpled to make a slight depression in the tubing to prevent rotation of the unit on the tubing. The design of the assembly is such that it will not crush even soft copper tubing.

More information? Circle Item 2 on postcard, page 105.

Electrical Heat Calculator

An electrical heat load calculator that gives the size electric heating unit required instantly from total load in watts is available from Paul S. Morton Engineering Service, Kalamazoo, Mich.

Though device operates like a slide rule, it reads like a table. It covers U-factors from .06 to 1.13. Standard model is based on 70-deg temperature difference, but other temperature differences are available.

To operate, one sets areas under an arrow, reads heat loss in watts. Total watts gives heating unit size. Price is three dollars.

More information? Circle Item 3 on postcard, page 105.

Air Door

Modernfold air doors, a product of Air Door Inc., Div. of New Castle Products, Inc., New Castle, Ind., seal entrances to hotels, office buildings, supermarkets, and shops with no doors or obstructions of any kind to detract from its appearance or its function.

Reduced to simple terms, the manufacturer states, the air door is an insulating wall of moving air. The air is directed downward in a continuous stream from overhead vents, with its direction and intensity varied, usually automatically, to compensate for changing wind conditions.

Air is then drawn through a grating in the floor, where it is filtered, cleaned, and heated or cooled before being returned to the overhead vents to repeat the cycle.

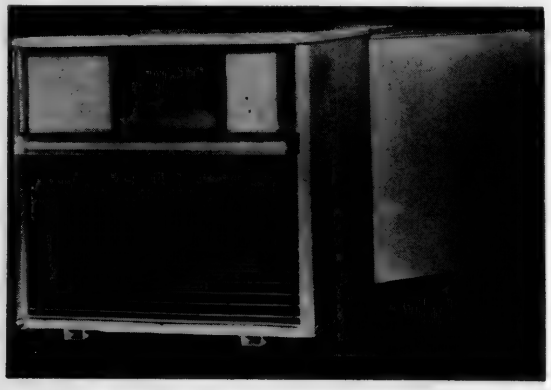
Many internal areas lend themselves to the installation of air doors. For example, cold storage rooms and areas set apart for precision manufacturing where rigid humidity or temperature controls are required.

Cooling and heating costs are reduced, the company says, because a continuous stream of air in the doorway is an effective barrier to loss of inside, conditioned air.

More information? Circle Item 4 on postcard, page 105.

Packaged Conditioners

Single-unit sealed circuit central air conditioners were added to its line of heating and air conditioning equipment manufactured by Thatcher Furnace Co., Garwood, N. J.



Intended for residential, commercial, and light manufacturing use, an economy 2 hp model, and a deluxe, high-capacity 3 hp model are offered. Both are suitable for almost any kind of installation, including flat roof, through-the-wall, attic, closet, pitched roof or dormer use, the company announced.

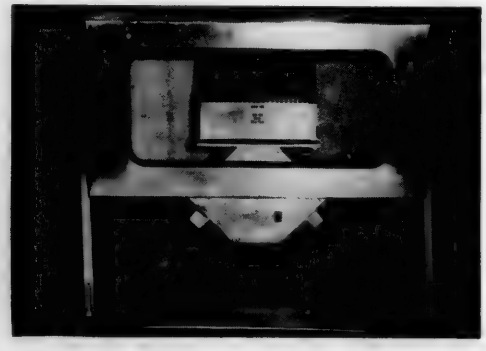
Features cited by the company include factory testing and assembly of all units, extra large surfaces and airways for reduction of air noise, 4-row condensers, and hermetically-sealed refrigeration components. There are no remote components or piping to install. Units are factory charged with Freon-22.

More information? Circle Item 5 on postcard, page 105.

Aluminum Air-Mixing Units

Dual duct air mixing units made entirely of aluminum are available to the building industry from Buensod-Stacey, Inc., New York, N. Y.

An aluminum flow control air mixing unit is a basic component in the company's dual-duct installations, in which streams of hot and cold air are forced through a building in twin ducts and mixed in each room or office area to provide climates meeting individual requirements.



The units bring the advantages of extreme corrosion resistance and cheaper installation through fewer man-hours, the company says. A major cost reduction will occur during unit installation due to the drastic weight differential between the aluminum unit and similar sheet metal units. Weighing approximately 21 lb they can be easily handled by one man.

Inner workings of air mixing unit are shown in illustration. Cover is removed, showing sound-hushing chamber and mixing apparatus. Warm and cold air arrive via dual ducts at bottom, and are mixed in response to thermostatic settings in a bellows arrangement behind the perforated metal cover. Because the mixing equipment shifts the flow of air from one main to the other, there is a variation in static pressure at the inlet of the unit. The units contain an automatic volume control to overcome this and to assure constant volume of air.

More information? Circle Item 6 on postcard, page 105.

Wrench Booster

Model TD wrench booster, a general-utility tool which boosts wrench turning force four times, is announced by X-4 Corporation, Acton, Mass. Used with standard sockets and wrenches, this rugged wrench accessory provides a 4-to-1 mechanical advantage for safe loosening and tightening of heavy threaded parts.

Heart of the booster is a set of planetary gears, built into a simple concentric tool head. It can be completely dismantled in seconds for occasional cleaning or lubrication, and is ruggedly built for torques up to 2000 ft-lb. Models TD 750 and TD 1000 are designed for socket-drives of ¾-inch and 1-inch respectively.

More information? Circle Item 7 on postcard, page 105.

Turbine Ventilator

Ground deep groove ball bearing, mounted in self aligning, shielded bearing housing, is found in the Centriflo turbine ventilator announced by Greenheck Fan & Ventilator Corp., Schofield, Wis.

Bearing has a basic load rating of 300 lb, 15 times the actual load on the bearing, the load being suspended from the bearing for a stable, balanced condition and elimination of friction due to unstable or tipping condition.

Housing permits bearing to run freely with no binding. Bearing is shielded from dust and moisture and packed with a light life-time grease with low viscosity over a wide temperature range.

Rotor is aluminum, suspended, with bearings, in rubber to eliminate noise and vibration, a first in the turbine vent field, the company states.

More information? Circle Item 8 on postcard, page 105.

Sub-Assembled Boiler

Addition to its line is a sub-assembled package Scotch marine steel heating boiler of the induced draft type, designed for easy on-the-job assembly by Federal Boiler Co., Inc., Midland Park, N. J.

It is shipped with matching burner, completely pre-wired control panel, draft inducer, all necessary operating controls, and lifting hooks and skids for easier rigging and installation.

Package is available for use with either No. 5 or No. 6 fuel oil.

Boiler is shipped with jacket and insulation installed, or without jacket if desired, and is shipped assembled with trim and accessories, except burner, panel and inducer.

The boiler is designed to readily accept for instant job-site installation the burner and draft inducer. Skids contain specially designed brackets for easy installation of the pre-wired control panel.

Units are in production in all 14 full range sizes of the regular Scotch marine line.

More information? Circle Item 9 on postcard, page 105.

Color-Styled Commercial Unit

The traditional iron-box design concept of packaged air conditioning units is outdated by the 1957 line of Westinghouse Electric Corp., Staunton, Va., due to modern, functional styling by the industrial design firm of Peter Muller-Munk Associates.

A commercial-type air conditioning unit, the Style-Master, has a striking combination of colors, charcoal and beige, which harmonizes with any interior. Additional color may be provided with "Choose-n-Change" panels in channel green, sea mist blue, chestnut brown, and penrod tan. Further contrast is available with anodized aluminum trim plates in copper, gold, or aluminum.

This unit, a free-standing model that can be equipped with a water or air-cooled condenser, is designed for such commercial establishments as restaurants, stores, barber and beauty shops, and offices. It features a spring mounted compressor and completely insulated cabinet which have lowered noise level by almost 50%.

More information? Circle Item 10 on postcard, page 105.

Input Controller

Ovens, furnaces, dryers, evaporators, and dehumidifiers requiring accuracy in control of operating temperatures can employ the ATC Type J-4A input controllers

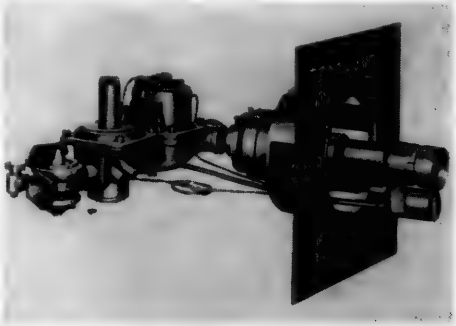
to remarkable advantage states the manufacturer. Automatic Temperature Control Co., Inc., Philadelphia, Pa., a subsidiary of Safety Industries, Inc.

Use of rheostats and their principle of regulating temperature by the dissipation of power load through resistance is avoided. Unit is approximately 4 x 4 x 5 inches.

More information? Circle Item 11 on postcard, page 105.

Inshot Gas Burner

Industrial, commercial, and domestic combustion equipment manufacturer, Ray Burner Co., San Francisco, Calif., announces the addition of Size 1, IG (Inshot Gas) burner to its line of oil, gas, and combination oil and gas firing equipment.



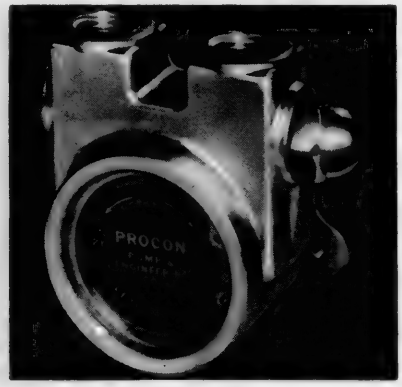
Primarily for use as a conversion burner on home furnaces and water heaters, this burner is substituted for the existing oil burner utilizing the same firing port and refractory.

Compactly designed and engineered to adapt to any type furnace, the burner provides automatic performance for thrifty heating. Safety is assured by flame safeguard controls. Quiet performance is achieved through the use of diaphragm type gas valves. Range input for the two models offered is from 80,000 to 265,000 Btu per hr.

More information? Circle Item 12 on postcard, page 105.

Pumps for Corrosive Service

Rotary vane-type, positive displacement pumps for corrosive liquids are announced by Procon Pump & Engineering Co., Oak Park, Mich. Capacities are 35 to 275 gph; pressures up to 300 psi; and suction lift is 28 inches of mercury. Will handle liquids to 375 deg F.



Made of bronze and carbon graphite, stainless steel and carbon graphite, and aluminum and carbon graphite, pumps are quiet because of the absence of metal-to-metal contact. Non-pulsating action results in longer life. They can be run dry for long periods without damage, the company states. An adjustable relief valve is built in.

Major applications are in carbonators, dishwashing machines, steam cleaners, air conditioning, and beverage equipment.

More information? Circle Item 13 on postcard, page 105.

High Air Delivery Blower Wheel

The Tab Lock series of blower wheels offered by The Torrington Manufacturing Co., Torrington, Conn., is designed to provide inherently high performance for a given space occupied in air-conditioning, heating and ventilating units and appliances. The wheel's space efficiency is provided by its individually-bladed construction in which increased air delivery is achieved with blades that are deeper, and with a wider working area in a given overall width and diameter.

The 36-bladed blower wheels are available in ten models. A 44-bladed model is also provided in this series. The wheel may be single or double width, steel or aluminum, and may have either plain, one-color spray lacquer, or zinc-plate finish.

More information? Circle Item 14 on postcard, page 105.

Quiet, Small-Size Transformer Line

New Type M transformer ratings through 50 kva single-phase and 150 kva three-phase to meet low noise level requirements in commercial buildings such as hospitals, motels, shopping centers, libraries, and offices are now available from Specialty Transformer Dept., General Electric Co., Schenectady, N. Y.

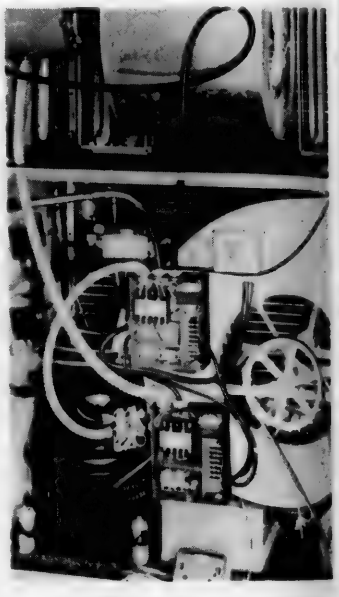
Expansion of the quiet, small-size line to meet specifications for higher kva ratings provide low noise levels for close proximity locations. The light-weight dry-type transformer line is dust proof, drip proof, and of fire resistant construction. The new ratings are designed for a noise level of approximately 45 decibels or below, according to company engineers. Audible sound level tests are made under NEMA specified conditions.

Designed to meet increased electrical load requirements in commercial buildings, the Type M line represents the first time the exposed type of core construction has been offered in these higher ratings for commercial buildings.

More information? Circle Item 15 on postcard, page 105.

Year-Round Conditioner

Genatron heat pumps, self-contained, packaged, and air-to-air, are available from General Air Conditioning Corp., Los Angeles, Calif.



Tecumseh compressor is spring mounted. Electrical controls, factory-wired to central master panel, include automatic reset thermal overload protection for compressor, *hi-low* pressure switches, low voltage dual control for year-round temperature regulation, pressure differential switch for defrosting, and a time-delay mechanism to prevent strip heaters and compressor from starting simultaneously. All supply air outlets may be changed in the field from top of cabinet to face of cabinet in a few minutes. Filters are aluminum industrial permanent type, re-useable.

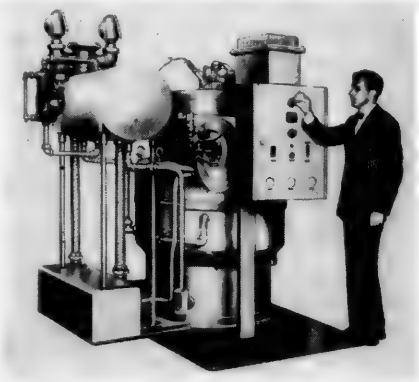
System will automatically switch from heating to cooling. Adjustable mercury switches provide single stage cooling and two-stage heating operation.

Three models remove 24,000, 37,700, and 65,500 Btu in summer, and deliver, with supplementary heaters automatically step-controlled, 40,250, 68,500, and 98,300 Btu in winter.

More information? Circle Item 16 on postcard, page 105.

Compact, Fast-Steaming Boiler

A drum-type water tube heating boiler of 150 hp rated capacity was displayed for the first time at the Chicago exposition by Vapor Heating Corporation, Chicago, Ill. Designated the Vapor Modulatic Drum-Type Boiler, it is about one-third the size of a conventional boiler of the same capacity. It is designed to produce low pressure steam, 5 to 15 psig, for heating industrial plants and other commercial buildings. Later models of this unit will produce steam up to 125 psig.



This boiler develops steam in five minutes from a cold start. Hot gases from an efficient forced draft fire, burning oil or city gas, wipe over and around four sets of steel coils, heating the water as it is pumped through the coils. Two turbine type water pumps, driven by one electric motor, re-circulate the water from the external steam drum through the coils. Steam rises off the water in the drum and passes through a separator inside the drum, to remove excessive moisture, before the steam is fed into plant's heating system.

Boiler package is equipped with several safety controls including steam temperature limit control, two safety valves, outfire control, and low water shutoff, built in accordance with ASME and Hartford Steam Boiler Codes.

More information? Circle Item 17 on postcard, page 105.

Chiller Has Built-in Condenser

A refinement of standard packaged water chillers is being marketed by Unarco Air Conditioning Products, a branch of National-U. S. Radiator Corp., Johnstown, Pa. Unit has a built-in evaporative condenser.

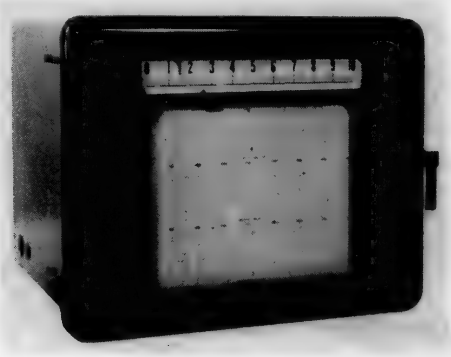
For industrial and commercial installations requiring a central water supply for individual fan-coil air conditioners, Model CWG-E was engineered to cover a broad span of out-going water temperatures, temperature drops, and tonnage ranges. The evaporative condenser can be installed as a component part of the unit or separately.

The utility of this unit is to provide summer comfort to buildings using steam or hot water radiator systems, using the piping of the building with the chiller. Unit is built in a wide range of models and sizes from 7½ to 75 hp.

More information? Circle Item 18 on postcard, page 105.

Electronic Multipoint Recorder

An easily read, operated, and serviced Series 8000 electronic multipoint recorder which can be used for the permanent recording of up to sixteen points on one chart is announced by Wheelco Instruments Div., Barber-Colman Co., Rockford, Ill.



Recorder is a null-balance instrument designed for long life and trouble-free service. Measurements may be obtained with sensing units such as thermocouples, radiation detectors, and other devices where the measured variable can be resolved into an electrical signal. Up to six limit switches may be incorporated to provide for high and low signal indication. Up to four switches may have common front set; additional switches are independently adjustable.

More information? Circle Item 19 on postcard, page 105.

Insulation Adhesive

An insulation adhesive for bonding insulation to ductwork is announced by Duro-Dyne Corp., New Hyde Park, N. Y.

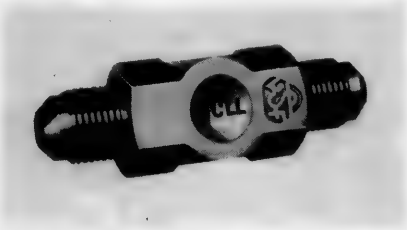
Created for bonding fiber to metal, fiber to fiber, for sealing joints, buttering insulation edges, its tack time, the company says, is only 10 sec, although its open-time range permits bond 1 hour after application of adhesive. Rapid coating of duct surfaces and positive bond of heavy insulating materials without auxiliary holding devices is therefore possible. Also, break-forming of metal and insulation without separation of insulation from metal can be performed immediately after bonding.

One gal will cover 230 to 270 sq ft. It will withstand temperatures from —30 deg F to 325 deg for blanket insulation, and from —30 to +250 deg for insulation board. It is solvent in petroleum-naphtha or white gas.

More information? Circle Item 20 on postcard, page 105.

Sight Glass for Refrigerants

A new product designed to solve a leak problem in many sight glasses and liquid indicators presently used in the refrigeration industry is available from Superior Valve & Fittings Co., Pittsburgh, Pa. Sight glasses are used to check on the condition of the refrigerant liquid.



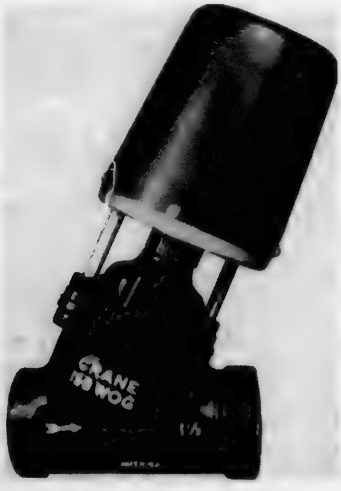
The double port sight glass is made from a one-piece forging. There are no joints, soldered parts, springs, gaskets, or fittings. Into the two ports is fused a heat-resistant, high tensile strength glass. The seal is hermetic; the bond is permanent.

The sight glass is only slightly larger than the tubing in which it is placed. By looking into the glass port opposite the word *Full*, the serviceman can tell at a glance if the refrigeration system is fully charged with liquid or not. The word *Full* is clearly visible only if the line is completely full of refrigerant.

More information? Circle Item 21 on postcard, page 105.

Electric Valve Controller

An all-electric rotary valve controller designed for mounting on the valve stem is announced by The Jordan Co., Milwaukee, Wis. Called the Valvetrol, it provides remote or automatic valve operation with proportional or *on-off* control.

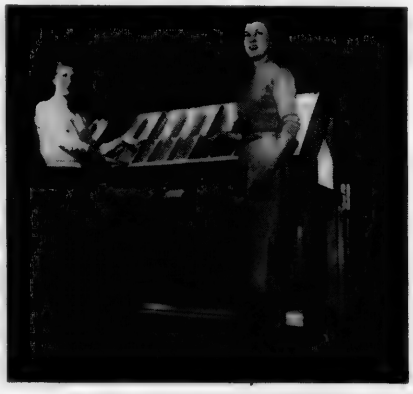


The Valvetrol is a self-contained gear motor with hollow output shaft that receives the valve stem. Stem diameters from ¼ to 1 inch can be accommodated. When used on rising stem valves the adaptor swallows the stem. Controller incorporates a built-in potentiometer which may provide remote indication of valve position or which may be used as a part of a balanced bridge control. Typical of the latter is its automatic proportioning systems where the valve setting must be proportioned to a signal that may originate from liquid level, flow rate, pressure or other source. Units can be furnished to provide follow-up accuracies of plus or minus 1/25 of 1%. Standard, low cost models provide accuracies of 1/5 of 1%.

More information? Circle Item 22 on postcard, page 105.

Multi-Zone Air Conditioner

An unusual and adaptable product displayed at the ASHAE Exposition in Chicago was this Multi-Zone Climate Changer developed by The Trane Company, La Crosse, Wis. Here the models note that both cooled and heated air is being delivered by the air conditioner at



the same time. The company manufactures units of this type which supply complete air conditioning, cooling only, heating only, cooling and ventilating, heating and ventilating, heating and humidification, or ventilation only for in-between seasons for as many as 25 different zones simultaneously.

The unit eliminates need for reheat coils and their separate controls in ducts leading to individual zones. At the same time, it allows for job-site zoning flexibility through an improved discharge damper section, which permits simplified damper grouping and duct installations. In addition to coils and new damper section arrangement, other matched components include redesigned double-width, low velocity unit fans, humidifier (3 types available), high or low velocity filters, and mixing box as specified.

Providing the advantage of using one source of either chilled water or refrigerant, the air conditioner is available in nine sizes with capacities ranging from 1700 to 29,000 cfm, and will supply complete year around air conditioning for an entire medium size building.

More information? Circle Item 23 on postcard, page 105.

Shields Brass Without Baking

Brasslyfe is a process that passifies and protects brass in one application according to its manufacturer, Logo, Inc., Chicago, Ill.

An air dry spray material, it is claimed to passify brass and prevent tarnishing and finger stains from appearing after the parts have been shipped. A hard, tough, durable coating, it shows excellent weather and humidity

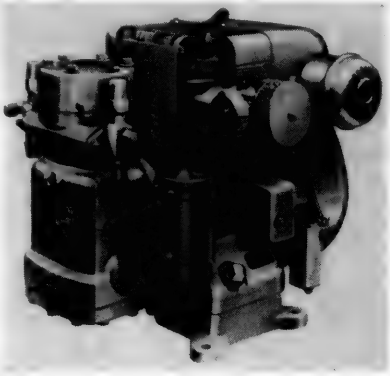
resistance. It can be sprayed, dipped, or brushed, and while chemical reactions continue for several days, parts can be packaged within an hour after application.

Heretofore, says the company, fingerstains and airborne contaminants have often shown up after a protective lacquer coating has been applied to the brass. In some instances, brass has been pre-treated to prevent this. Also, many firms, to secure a tough, durable coating, have used baking finishes. Company claims to have combined these two processes into one without requiring a baking system.

More information? Circle Item 24 on postcard, page 105.

Engine-Compressors

Self-powered, gasoline or propane-burning engine compressors for applications in air conditioning and refrigeration where a ready supply of electricity is not available, are announced by D. W. Onan & Sons Inc., Minneapolis, Minn.



Available in three sizes with capacities ranging from one to five tons, they are intended primarily for mobile use. High-performance compressors are mounted directly to short-stroke, 4-cycle, air-cooled engines.

More information? Circle Item 25 on postcard, page 105.

Corrosion-Resistant Ducts

Expansion of its line of corrosion-resistant polyester glass fume ducts to include standard sizes to 24 inches in both rectangular and circular ducts is announced by Haveg Industries, Inc., Wilmington, Del.

Ducts are molded into a single piece, as illustrated. Glass smooth inside and out, they are claimed to provide high resistance to chemical corrosion of acids, hypochloride salts, weak alkalies, and many organic solvents.

Special sizes and shapes are produced to customers' specifications.

More information? Circle Item 26 on postcard, page 105.

Baseboard Radiation Panels

A new design of baseboard radiation panels is introduced by General Republic Heating Products Co., Philadelphia, Pa. The Repco Thrift-Master Type R.O. 1000, as the new panels are called, are furnished in 8-ft lengths consisting of two plates, a back and front. The front plate may be removed, even when recessed,

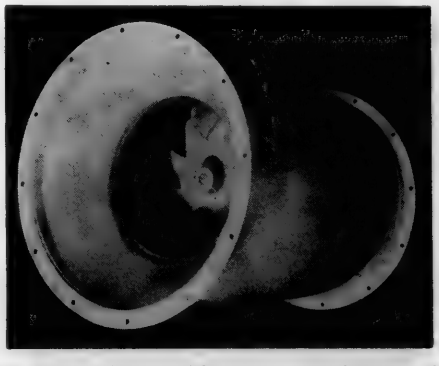
to permit easy cleaning of the heating element and the offset edges of the back plate are designed to insure an accurate, snug, crack-free fit between sections. The heating element consists of 2⅛ x 2⅛-inch square fins mechanically bonded to ¾-inch copper tubing.

All baseboard units are rated for hot water heating capacities based on results of tests made in accordance with IBR testing procedures. Complete rating information and dimensional details are available.

More information? Circle Item 27 on postcard, page 105.

Tubular Centrifugal Fan

Compactness of tubular fans and quietness of scroll centrifugals are combined in a centrifugal fan designated a tubular centrifugal by Dryer Electric Corp., Brooklyn, N. Y.



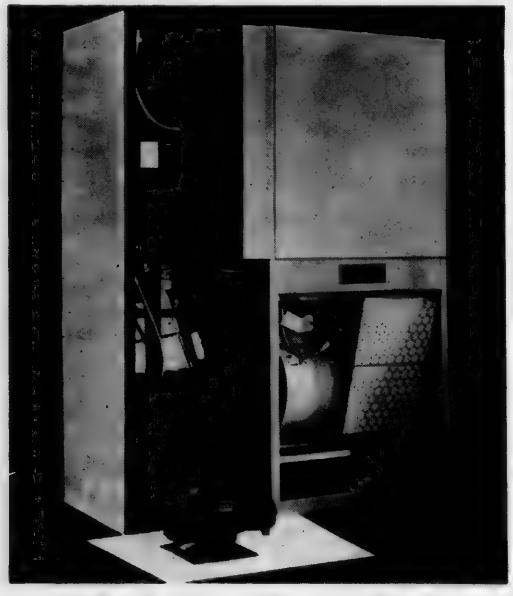
Despite external resemblance to axial fans, this is a true centrifugal in operating principle and in low noise level and other performance characteristics, the company states. Very high selection area is provided by the tubular centrifugal's efficiency curve peaked near the normal selection-range midpoint. Pressure curve rises continually up to no-delivery.

More information? Circle Item 28 on postcard, page 105.

Oil-Fired Air Conditioner

Development of a successful oil-fired residential year-round air conditioner is announced by Servel, Inc., Evansville, Ind.

Two affiliates of the Standard Oil Company of New Jersey participated in two years of research and field-



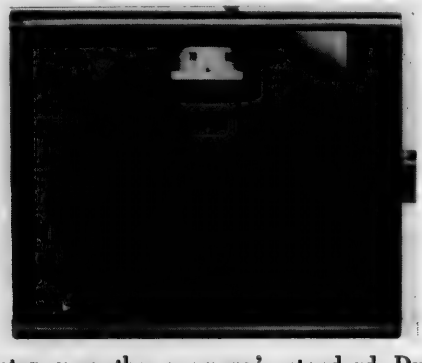
testing. Gilbert & Barker Mfg. Co., West Springfield, Mass., developed a low-pressure air-atomizing burner for the conditioner. It burns approximately ½ gph to produce 3 tons of refrigeration, or by flipping a switch, 9/10 gph to deliver 96,000 Btu per hr for winter heating. Laboratory and field testing was conducted by Esso Research & Engineering Co., Linden, N. J.

Unit will be shipped in a single crate, can be prepared for installation in less than an hour, and will require 10.4 sq ft of floor space. All controls are factory installed. Models will be ready for distribution before summer.

More information? Circle Item 29 on postcard, page 105.

Drum-Type Indicator

A drum-type precision indicator for quick readings of variables at remote points is announced by The Bristol Co., Waterbury, Conn.



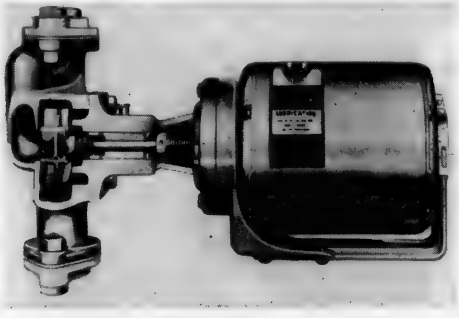
Indicator uses the company's standard Dynamaster electronic instrument components. It is equipped with numbered push button switches on the front of the case, and can scan up to 48 remote points quickly. The revolving drum-type scale has a calibrated length of over 26 inches. Full-scale travel takes place in 4½ sec.

Offered primarily in resistance thermometer and pyrometer models, it can also be supplied for measuring other variables.

More information? Circle Item 30 on postcard, page 105.

Circulator Passes Tests

Circulator No. 112, designed especially for combination heating-cooling unit installations, is announced by Taco Heaters, Inc., Cranston, R. I.



Components include: 3450-rpm motor, head up to 23 ft, mechanical seals, spring drive coupling, enclosed impeller, rubber-mounted motor, overload protection, interchangeable flanges ¾ to 1½ in.

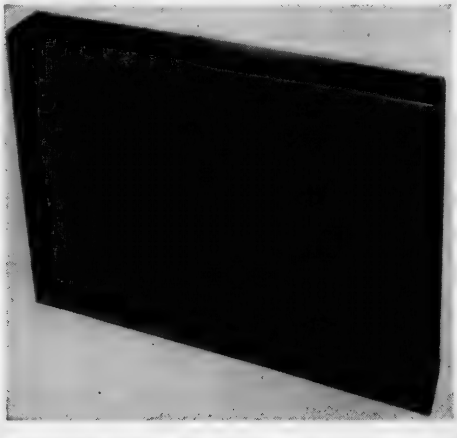
More than two years of field testing has been performed, the company states. Low cost and quiet operation is promised.

More information? Circle Item 31 on postcard, page 105.

Plastic Tower Eliminator

A cooling tower eliminator manufactured completely of styrene plastic is offered by Quick Plastics, Div. of Quick Industries, Inc., Jackson, Mich.

Fins, spacers, and case are all extruded sections cemented together with water-proof cement. The cement liquefies the surfaces being joined which then solidify, making the entire eliminator a one-piece unit. Unit



will not corrode, being impervious to water and air. An eliminator which is 24 x 32 x 4 inches with 30 fins

weighs less than 8 lb. It may be used as wetted deck, if desired.

The company states that the plastic model will cost 80% of the equivalent galvanized steel unit. This saving can be realized without any change in design since plastic models can be fabricated to replace almost any steel unit now in use.

More information? Circle Item 32 on postcard, page 105.

A-C D-C Welders

The Lincoln Electric Co., Cleveland, Ohio, has added two welders to its line of Idealarc combination a-c and d-c welders.

Machines are of 180 and 250-amp capacity. They are designed to meet the needs of job shops, garages, sheet metal shops, light production welding, and maintenance welding in business, industry, and on farms.

Welders operate equally well either as an a-c transformer type welder or a d-c rectifier type welder. A switch on the front panel changes the welder from a-c operation to d-c positive or d-c negative. The 2-in-1 feature enables operation of all types of manual electrodes, including stainless and alloy rods. Units are also available as straight a-c machines, without d-c, to which the d-c rectifier can be readily added at a later date, if desired.

More information? Circle Item 33 on postcard, page 105.

New Air and Water-Cooled Units

A completely self-contained air-cooled horizontal air conditioner, the Tuckaway, which may be suspended from the ceiling or installed in existing attic, basement, attached garage, transom or crawl space, is announced by Perfection Industries, Div. of Hupp Corp., Cleveland, Ohio. The unit can be integrated into existing heating ducts to provide a completely automatic warm and cool air system. Also available are special preformed, insulated, and vapor-proofed lightweight ducts for fast, low-cost installation. The model is available in capacities of 1½, 2 and 3 tons.

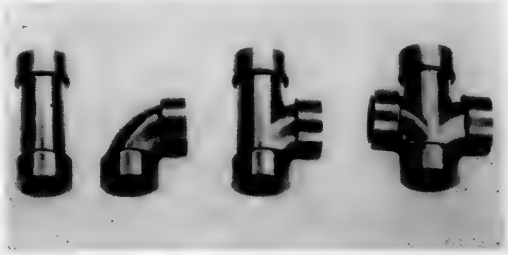
The new line of air-cooled remote central residential air conditioners in 3 and 5-ton capacities is available with a choice of three different evaporator and coil arrangements. The self-contained water-cooled units are supplied in 2, 3, 4 and 6-ton sizes. The 2, 3 and 4-ton models have blower section and basic cooling unit that can be interchanged for upflow or downflow operation. Each section can be rotated to four positions, affording 30 different air flow applications. This exclusive feature, the company states, enables the installer to meet any installation problem.

In its 1957 heavy-duty commercial air conditioner line, the company offers air-cooled equipment up to 10-ton capacity and water-cooled units up to 40 tons.

More information? Circle Item 34 on postcard, page 105.

PVC Drainage Fittings

Sizes of new polyvinyl chloride drainage fittings, available from Tube Turns Plastics, Inc., Louisville, Ky., range from 1½ through 4 inches. They match schedule 40 PVC pipe of corresponding dimensions and are available in elbows, tees, and standard branch connections.



The company lists as advantages of PVC drainage pipe and fittings lower material cost, lower labor cost, light weight, no breakage under normal circumstances, unimpeded flow conditions, and resistance to galvanic or electrolytic action. Only a can of solvent cement and a brush are required to join pipe and socket-type fittings.

More information? Circle Item 35 on postcard, page 105.

Brass Strainer

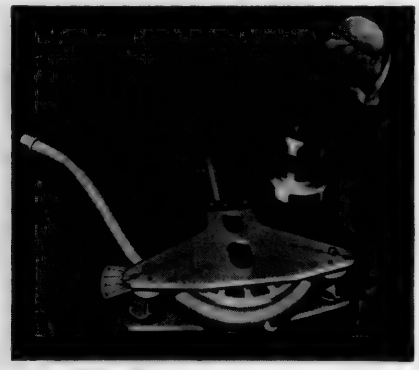
Watts Regulator Co., Lawrence, Mass., announces a low-cost all-brass strainer. Series 137 strainer is designed

for applications requiring fine straining of air or gases and is particularly suited for keeping regulators clean. The removable strainer element is indestructible porous bronze which, the company states, effectively strains out particles .004 inch and larger (90 microns). Available in pipe sizes ¼, ⅜, and ½ inches, they are suitable for pressures up to 500 psi.

More information? Circle Item 36 on postcard, page 105.

Hydraulic Pipe Bender

Production of a new line of 3- and 4-inch hydraulic pipe and conduit benders is announced by Blackhawk Mfg. Co., Milwaukee, Wis. The line of benders now includes hand and electrically-operated hydraulic units to bend pipe and rigid conduit from ½ through 4-inch dia.



Models handling pipe up to 3-inch dia are S-138, which includes hand pump, and S-139, which comes complete with electrically-driven hydraulic pump. For 4-inch pipe bends, S-137 has hand pump, and S-140 has electric pump.

All four models come equipped with the company's Optik-Angle gage which eliminates guesswork. The operator is able to tell at a glance exactly what degree of bend he has.

More information? Circle Item 37 on postcard, page 105.

Small Electronic Filter

Electro-Klean, a dry-type electronic filter for light commercial and home use, is available from American Air Filter Co., Louisville, Ky. It is backed by five years of actual use and testing under many conditions, the company states.

Designed for small shops, retail stores, restaurants, and clubs, it requires no water or sewer connections, is mounted in any convenient location on the return air side of a forced air furnace or air conditioner. Unit uses no more current than a 10-watt light bulb.

Through use of a printed circuit, the company says, and other production economies, mass production was possible, and hence, a price considerably below competitive models. Unit traps nearly 90% of dirt and dust.

More information? Circle Item 38 on postcard, page 105.

Commercial Vacuum Machine

Model P950H, called Spic-Span, is a commercial and industrial vacuum machine manufactured by the Premier Company, St. Paul, Minn.

A pleated filter provides three times the normal filtering area without overlapping or clogging; permitting cooler motor operation and higher cleaning efficiency, the company states. Filter need not be cleaned until the machine is normally full. Two types of auxiliary filters are available. One is acid, mildew and flame resistant; the other is a disposable paper filter.

Weighing 28 lb and designed for one-man handling, unit has a full ½-bushel capacity which is ordinarily considered adequate for an annual cleaning of 5 average domestic oil furnaces. When combined with the special filter, this capacity renders the machine capable of at least a full-day's operation without work interruption.

More information? Circle Item 39 on postcard, page 105.

Light-Weight Leak Detector

Use of five miniature hermetically sealed transistors has made it possible to produce its M-Scope leak detector weighing only 7 lb complete with leather carrying case, according to the manufacturer, Fisher Research Laboratory, Inc., Palo Alto, Calif. Size is 9 by 9 by 5 in.

Typical applications are in the detection and location of leaks in water and oil pipe lines beneath soil, pavement, or cement; the testing of newly-completed lines for leaks; and the location of leaks beneath cement floors in residential and commercial buildings.

Battery drain is much reduced because of the transistors replacing microphonic tubes. A built-in battery test circuit is included for convenient maintenance.

More information? Circle Item 40 on postcard, page 105.

(*Continued on page* 126)

SO HALSTEAD & MITCHELL ENGINEERS SAID:

CENTRIFUGAL FAN COOLING TOWERS ARE IDEAL FOR LONG DUCT RUNS

Halstead & Mitchell Centrifugal Fan Cooling Towers maintain an even air flow through short or long ductwork runs where high resistance is normally a problem. This makes them particularly suitable for indoor use—whether the application be industrial, commercial or residential.

There's a bonus for indoor users. The centrifugal fan used by Halstead & Mitchell is ultra-quiet. When decibels are a problem, no propellor-type fan can compete.

Like all H&M Cooling Towers, these units conserve up to 97% of cooling water used in air conditioning and refrigeration applications. The 20-Year Guarantee on the wetted deck wood against failure due to rotting or attack by fungus is offered by Halstead & Mitchell exclusively. Cabinet steel is triple-protected for extra long life.

TAKE-APART, TOO!

An especially interesting optional feature of the H&M Centrifugal Fan Cooling Tower is found in the Take-Aparts. These can be dismantled for installation in difficult places by removing a few bolts. Basement or rooftop installation becomes easy. The Take-Apart feature is not standard, but may be ordered as an optional extra.

Centrifugal Fan Cooling Towers are available in 5 through 25 ton sizes, or may be paired when larger capacities are required. Write for full details in Bulletin CF 600. *Halstead & Mitchell, Bessemer Bldg., Pittsburgh 22, Pa.*

AVAILABLE AT LEADING WHOLESALERS EVERYWHERE

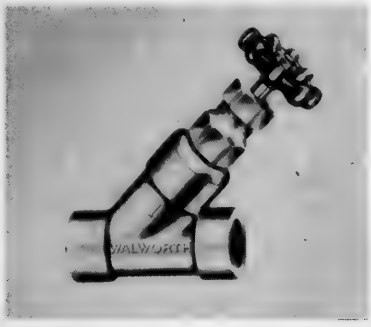
HM

Halstead & Mitchell

(*Continued from page* 124)

Corrosion-Resistant Valve

An all-plastic Y-globe valve with full flow passage is introduced by Walworth Company, New York, N. Y. Made of rigid polyvinyl chloride the valve provides tight shutoff and flow control of alkalis, acids, inorganic salt solutions and other corrosive fluids. A special bonnet and gland nut design provides an absolute leak-proof unit. Because of its sturdy construction, the valve will



operate successfully at pressures up to 150 psi at 75 deg F.

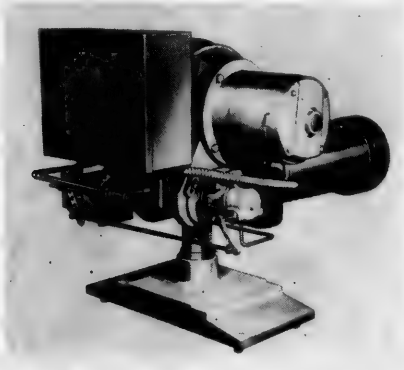
An all-plastic assembly increases its durability. Each part is resistant to outside corrosion. Life of the valve's packing is prolonged through a tapered back seat on the stem which permits repacking under pressure. The same design also reduces pressure on stem packing when valve is opened completely.

About 1/6th the weight of an equivalent brass or steel valve, the PVC valve reduces handling and installation costs. The valve will be available with threaded and solvent-weld socket-type ends.

More information? Circle item 41 on postcard, page 105.

Finely Atomizing Oil Burners

The use of low cost, heavy No. 5 fuel oil for fully automatic heating of commercial buildings is now practical with a series of oil burners announced by Iron Fireman Manufacturing Co., Cleveland, Ohio. The new burners are named MicroMist, to describe the complete atomization of oil into a fog.



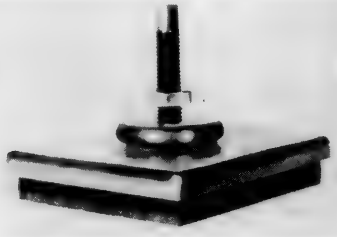
The heart of the burner is a supercharger, or compressor. The oil is mechanically atomized as oil and primary air pass into the compressor; however, in addition, the compressor-atomizer further reduces the oil spray, by heat of compression, to a microscope air-oil mist.

No gas is required for igniting the burners; a simple, direct electric ignition system is used. All burners in the line operate with a single motor; all are UL approved. They can be applied to all types of existing boilers or used as a component part of a packaged boiler-burner unit.

More information? Circle Item 42 on postcard, page 105.

Self-Leveling Machinery Mount

A new self-leveling machinery mount, called the Level-Rite, has been announced by the Unisorb Division of The Felters Company, Boston, Mass. It consists of an all-steel base unit with leveling screw and leveling plate, combined with the company's Vibration-Dampener Pad.



This mount is designed in seven models with loading ranges from 800 to 7500 pounds per unit; and in four sizes, 4, 6, 8, and 10 inches square. One unit is required for each machine leg or mounting point.

The mount is said to have two special features: An exclusive screw-post design by which a machine is quickly and easily leveled. The only action required is rotation of the square top of the screw post to bring machine to level position, then securing lock nut. The second advantage is the ease of anchoring. No bolts, lag screws or cement are needed.

More information? Circle Item 43 on postcard, page 105.

Smaller Motor

To meet more rigid requirements of space, amperage, and power factor, a small-size, fractional-horsepower, permanent split-capacitor motor for air conditioning and related air-moving equipment is announced by Marco Industries, Inc., Womelsdorf, Pa.

Model D-4 is only 4⅝ inches in diameter, small enough to be mounted inside a blower wheel in an in-wheel design. In view of the prevailing tendency to reduce physical sizes of room air conditioners, this motor should be in demand, the company states. It can be installed in horizontal, vertical or inclined position.

Motor has improved efficiency and power factor, lower amperage for hp rating, cooler operation, and good stability. It meets Underwriters' rain test and carries the yellow U-L tag.

Ratings are from 1/150 up to 1/5 hp; 115, 230 or 208 volts; 50 or 60 cycles; 2, 4, 6 or 8 poles. Single or multiple speeds: 2-pole, 3,400 rpm; 4-pole, 1,600 rpm; 6-pole, 1,050 to 1,100 rpm; 8-pole, 750 to 800 rpm.

More information? Circle Item 44 on postcard, page 105.

(*Continued on page* 128)

"NO MATTER HOW TOUGH THE FABRICATING JOB, WEIRKOTE'S® ZINC COATING STAYS PUT!"

Weirkote users know *that* as well as they know their own names. And no wonder! Look how profitably Weirkote zinc-coated steel fits into a fabrication operation.

Weirkote has the tight, continuous-process zinc coating that can stand up to every fabrication procedure, such as the beading and cutting of elbow tubes pictured above, and *stay* tight. No flaking or peeling problems. Far less chance of hidden flaws or only temporary corrosion resistance in the finished product.

In a nutshell, we produce a zinc-coated steel sheet that enables you to give your customers even more built-in value for their dollars. You simplify your production problems and make some important cost savings at the same time.

Why wait? Find out how Weirkote's corrosion resistance, strength and ability to come through severest fabrication stresses unblemished, can help you. For free booklet write to Weirton Steel Company, Dept. N-4, Weirton, West Virginia.

WEIRTON STEEL COMPANY

WEIRTON STEEL COMPANY

WEIRTON, WEST VIRGINIA

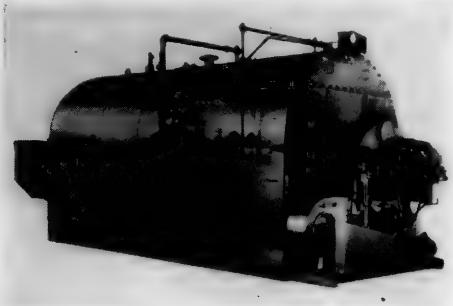
a division of

NATIONAL STEEL CORPORATION

(*Continued from page* 126)

Packaged Boiler Line Expanded

A choice of either forced draft or induced draft fans is now available on an expanded line of Econo-Therm package boilers, in sizes from 20 to 500 hp, manufactured by Dutton Boilers Div., Hapman-Dutton Co., Kalamazoo, Mich. All sizes also have the exclusive feature of off-center firing, which the manufacturer states, creates a more positive water circulation in a rotary motion, increases safety with a higher column of water over the hot furnace, and eliminates surging and priming to deliver a higher quality, drier steam.



Down-draft third pass design is also featured, with third-pass gases passing through the cooler portion of the boiler, gaining maximum heat transfer and increased fuel economy. This design is said to help preheat make-up water and relieve boiler shock due to temperature differential, thus lengthening boiler life.

All units can be fired with gas, heavy or light oil or combination burners with either forced draft or induced draft fan. Electronic controls, including approved flame-failure safeguards, are factory-installed and tested in operation. Each unit is furnished with a certified ASME authorized data report, and is shipped ready to make service connections.

More information? Circle Item 45 on postcard, page 105.

Gas and Air Filters

A new line of gas and air filters for 6, 8 inch and larger pipe sizes has been announced by Norwalk Valve Co., South Norwalk, Conn.

The filters are equipped with a patented built-in baffle that assures maximum passage of gases and air through the filtering material and gives complete removal of dust and scale. They are reversible end-for-end and top-for-bottom to eliminate the possibility of improper installation in the field.

The company produces filters in a wide range of sizes, as well as check valves, manometers, pressure controllers, appliance regulators, station regulators and relief valves.

More information? Circle Item 46 on postcard, page 105.

Automatic Flanger

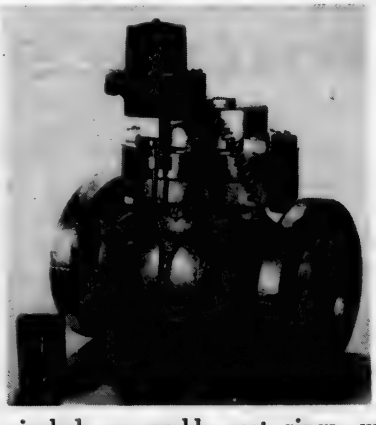
Auto-Guide flanger, announced by The Lockformer Co., Chicago, Ill., automatically follows any edge that might be fed into it: straight, irregular, inner or outer radii and, according to the manufacturer, turns a perfectly uniform flange every time and regardless of the shape involved.

Made in two models, one to fit either the "20" or "22" Lockformer, the other to fit the "24", flanger has a capacity of 20 gage metal or lighter, turns a flange height of 7/32 inch, and has a forming speed of 16 to 18 fpm.

More information? Circle Item 47 on postcard, page 105.

Cast Steel Solenoid Valves

A new line of cast steel solenoid valves for liquids to 600 psi is now available from J. D. Gould Co., Indianapolis, Ind., in sizes from 2 through 4 inches. They can be either globe or angle pattern with screwed or flanged pipe ends.



Features include renewable seat rings, unbreakable piston rings and packless operation over a wide pressure range. The valves are designed to eliminate damaging hammer and shock in automatic or remote control.

More information? Circle Item 48 on postcard, page 105.

(*Concluded on page* 130)

The most important material of all!

Many items are going into the building of our new Sidney plant — steel, brick, cement, glass. But you cannot see the one element that makes the entire project possible — FAITH.

We have faith in the fine Copeland organization — from factory workers to our jobbers and dealers.

We have faith in the quality of Copeland products.

We have faith in the future of our industry, as the demand for refrigeration and air conditioning constantly increases.

We have faith in the growth of America and the system of free enterprise which has given us the highest standard of living in the world.

LIVE BETTER ELECTRICALLY

SINCE 1918

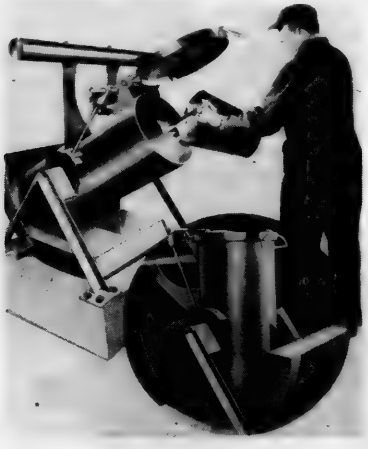
Manufacturer of the heart of America's finest commercial refrigeration and air conditioning

Copeland REFRIGERATION CORPORATION, Sidney, Ohio

(*Concluded from page* 128)

Incinerator Safety-Feed Device

A new kind of incinerator safety-feed device for use on large industrial top loading incinerators now in use in office buildings, banks, hotels, stores, hospitals, and apartment buildings was announced by Brodie Engineering Corp., Saint Paul, Minn.



This safety-feed device provides a fool-proof method for loading large incinerators having top openings. This basic feature of this safety-feed device by its very nature, prevents the escape of any possible flame flashes coming up through the charging opening while in the act of loading. This in turn, eliminates all of the formerly-existing hazards to personnel and property open to exposure from flame, smoke, and gases coming out through the charging hole.

The unit itself is a heavy steel-plate drum, mounted to tilt on trunions and equipped with a specially designed mechanism to close all openings as the charging operation occurs. The large photo shows the unit in the tilted loading position and the inset shows it in the vertical discharge position.

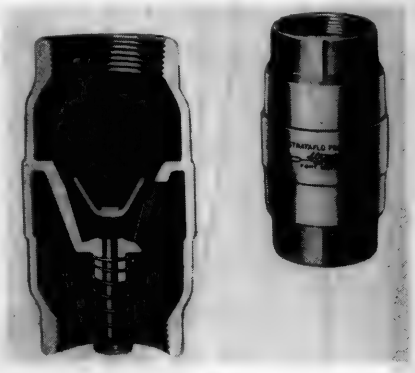
More information? Circle Item 49 on postcard, page 105.

Noiseless Check Valves

Check valves are available from Strataflo Products, Inc., Fort Wayne, Ind., in two types. Valve illustrated has rubber poppet for noiseless operation. The other has Monel poppet for severe operating conditions.

Check valve with rubber poppet operates in any position because a sensitive spring closes the poppet automatically. The poppets are made of a tough and flexible rubber composition. It is resistant to many acids and will stand abrasive-carrying liquids. Flexibility ensures tight closure under all conditions. Poppets are Silicone treated and cannot stick. Valve is recommended for use on discharge lines of pumps where noise resulting from operation of the conventional type of valve is objectionable, and for use on very low pressures. Liquid flows in a straight line through the valve.

Not illustrated is all-position line check valve with flexible Monel metal poppet, ruggedly constructed to stand severe operating strains far beyond its rated pressure of 200 lb. Design of seat gives large port area. Body is made of Navy-Bronze and the poppet is of



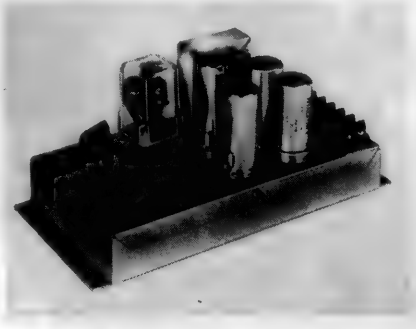
nickel alloy which resists all elements and wears well. These valves are recommended for a wide range of service in check lines for steam, hot water, cold water, oil, gas, and compounds.

The rubber poppet check valves are available in ¾ to 2 inch, while the metal poppet valves are available in ⅜ inch to 2 inch.

More information? Circle Item 50 on postcard, page 105.

Electronic Temperature Controller

With differential of plus or minus 0.1 deg F for all ranges, this precision electronic temperature controller, Model 63, improves regulation of calibrating baths, ovens, extruders, and many other processes by providing extremely close *on-off* action. Available from Yellow Springs Instrument Co., Inc., Yellow Springs, Ohio, its small size, easy installation, simple maintenance,

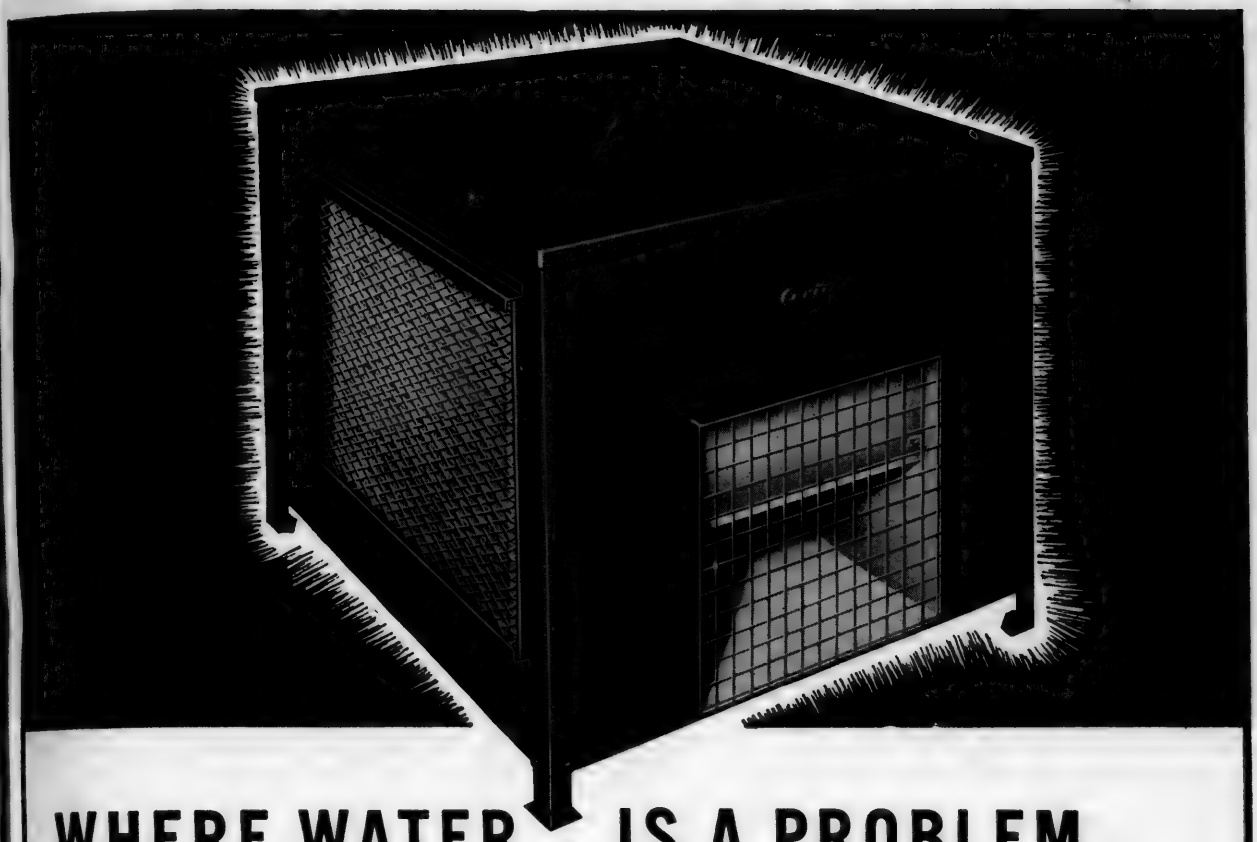


ease of adjustment, and exceptionally low cost also make it an excellent choice for building into equipment requiring accurate temperature control.

The unit is available in several temperature ranges from −100 to +500 deg F, and can be installed remotely from sensing element and grouped in standard conduit boxes for multiple control applications. Power supply is self-contained in each unit, and control action is virtually unaffected by line variations between 105 and 125 volts.

For use with the model is the widest variety of thermistor probes available. Over 10 types, ranging from 3/16-inch stainless steel tubular spring loaded units to hypodermic needles, and suitable for gases, liquids, and solids, are applicable.

More information? Circle Item 51 on postcard, page 105.



WHERE WATER IS A PROBLEM

Curtis HAS THE ANSWER

For More Profits... More Customer Satisfaction with NEW CURTIS Waterless Air Conditioning Unit

The new, improved Curtis packaged, waterless, air-cooled air conditioning unit is designed to build sales for *you*—to give *your* customers *more* for their money.

ALL NEW ALUMINUM SHELL will *not* rust, is extremely lightweight, lasts forever.

NEW PERMANENT, COLORWELD FINISH will *not* peel or chip, requires *absolutely no* maintenance.

COVERED BY 5 YEAR PROTECTION PLAN.

COSTS LESS TO INSTALL AND TO OPERATE

No tower required. In majority of jobs, existing duct work can be used. No expensive plumbing needed. No water bills to pay. Does away with *all* water problems.

Every Curtis unit is backed by 103 years of experience and skill. Curtis has a complete, flexible line of air conditioning equipment—nationally advertised to help you sell.

YOU CAN COUNT ON REMEMBER...

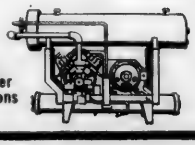
Curtis

OUR 103rd YEAR

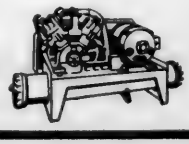
MANUFACTURING COMPANY
REFRIGERATION DIVISION
1999 Kienlen Ave. St. Louis 20, Mo.

CM-17

Packaged Air Conditioning Units 3 thru 50 tons



Packaged Liquid Chiller 7½ to 100 tons



Condensing Units Up to 100 tons F-12 or F-22

DEGREE-DAYS FOR FEBRUARY, 1957

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING'S 29th Year of Publication of Monthly Degree-Day Data

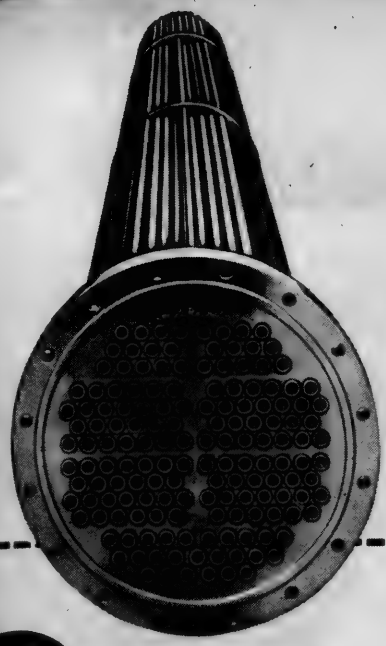
City	February			Season to February 28, incl., from Sept. 1		
	1957	1956	Normal	1956-57	1955-56	Normal
Abilene, Texas (A)	327	511	479	1885	2205	2250
Albany, New York (A)	1006	1123	1179	5058	5161	5056
Albuquerque, New Mexico (A)	468	836	714	3029	3064	3441
Alpena, Michigan (C)	1135	1220	1263	5411	5442	5448
Asheville, North Carolina (C)	505	584	678	2625	3254	3105
Atlanta, Georgia (A)	291	396	512	1690	2355	2269
Atlantic City, New Jersey (C)	721	741	829	3125	3450	3331
Augusta, Georgia (A)	251	335	412	1465	2162	1768
Baltimore, Maryland (C)	719	679	776	2926	3331	3193
Billings, Montana (A)	1053	1155	1089	5151	5622	5133
Binghamton, New York (C)	1058	1041	1100	4637	4832	4735
Birmingham, Alabama (A)	281	366	491	1633	2327	2252
Bismarck, North Dakota (A)	1432	1618	1464	6563	7552	6652
Block Island, Rhode Island (A)	(a)	904	955	(a)	3998	3917
Boise, Idaho (A)	848	1085	868	4681	4397	4377
Boston, Massachusetts (A)	842	936	1002	4083	4251	4123
Buffalo, New York (A)	951	1061	1128	4464	4795	4777
Burlington, Iowa (A)	881	1077	1036	4382	4909	4641
Burlington, Vermont (A)	1112	1209	1313	5542	5647	5632
Cairo, Illinois (C)	553	614	683	2708	3163	3004
Charleston, South Carolina (C)	238	228	363	1112	1560	1466
Charlotte, North Carolina (A)	420	490	577	2010	2573	2555
Chattanooga, Tennessee (A)	398	465	588	2127	2804	2693
Cheyenne, Wyoming (A)	833	1222	1044	4762	5101	5109
Chicago, Illinois (C)[b]	(a)	984	1039	(a)	4319	4401
Cincinnati, Ohio (C)	725	702	812	3076	3483	3465
Cleveland, Ohio (A)	891	967	1019	4036	4402	4322
Columbia, Missouri (A)	707	882	876	3369	4045	3934
Columbia, South Carolina (A)	283	370	443	1537	2212	1889
Columbus, Ohio (C)	776	840	907	3570	4089	3953
Concord, New Hampshire (A)	1062	1144	1226	5478	5375	5457
Concordia, Kansas (C)	797	1019	899	3892	4528	4091
Dallas, Texas (A)	288	434	432	1741	2000	1909
Dayton, Ohio (A)	829	894	941	3860	4326	4157
Denver, Colorado (A)	674	1072	924	3955	4257	4397
Des Moines, Iowa (A)	952	1137	1092	4653	5297	4877
Detroit, Michigan (A)	958	1061	1072	4370	4611	4600
Devils Lake, North Dakota (C)	1557	1739	1576	7157	8066	7237
Dodge City, Kansas (A)	696	976	840	3626	4026	3867
Dubuque, Iowa (A)	1022	1235	1187	5156	5606	5366
Duluth, Minnesota (C)	1487	1530	1448	6964	7001	6677
Elkins, West Virginia (A)	761	783	910	3816	4444	4182
El Paso, Texas (A)	205	578	555	1866	1874	2201
Ely, Nevada (A)	855	1312	1033	5204	5251	5199
Escanaba, Michigan (C)	1239	1308	1327	5797	5145	5856
Evansville, Indiana (A)	650	703	770	3222	3662	2424
Fargo, North Dakota	1465	1714	1518	6615	7526	6851
Fort Smith, Arkansas (A)	423	585	571	2381	2844	2619
Fort Wayne, Indiana (A)	903	1020	1036	4342	4690	4601
Fort Worth, Texas (A)	311	445	446	1833	2034	1958
Fresno, California (A)	321	558	400	2122	2010	2040
Galveston, Texas (C)	104	188	247	611	877	1005
Grand Junction, Colorado (A)	948	982	924	4622	3952	4488
Grand Rapids, Michigan (A)	1024	1166	1154	4676	5011	5033
Green Bay, Wisconsin (A)	1229	1369	1336	5859	6002	5887
Greensboro, North Carolina (A)	528	617	672	2615	3167	2991
Greenville, South Carolina (A)	416	503	552	2059	2587	2425
Harrisburg, Pennsylvania (A)	809	850	921	3782	4031	3943
Hartford, Connecticut (A)	911	971	1050	4630	4554	4494
Hatteras, North Carolina (C)	395	413	487	1536	2171	1802
Havre, Montana (C)	1319	1436	1291	6094	7086	6044
Helena, Montana (A)	1202	1344	1165	6000	6483	5881
Houston, Texas (C)	119	209	240	736	991	1083
Huron, South Dakota (A)	1240	1618	1327	5737	8149	5927
Indianapolis, Indiana (A)	793	906	938	3839	4360	4201
Jackson, Mississippi (A)	241	314	405	1437	1986	1822
Kansas City, Missouri (A)	719	877	851	3502	3980	3811
Knoxville, Tennessee (A)	425	507	630	2198	2991	2844
La Crosse, Wisconsin (A)	1116	1371	1280	5332	6014	5708
Lander, Wyoming (A)	903	1391	1179	5345	5852	5982
Lewiston, Maine (O)	1078	1141	1243	5457	5147	5532
Lincoln, Nebraska (C)	857	1083	1000	4109	4866	4483
Little Rock, Arkansas (A)	409	506	543	2140	2553	2441

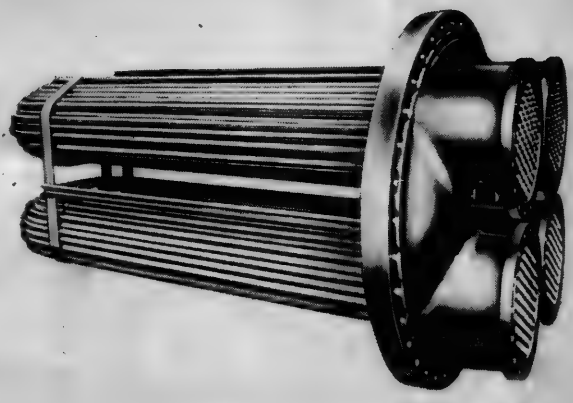
(a) Data not available. [b] Grant Park weather station.

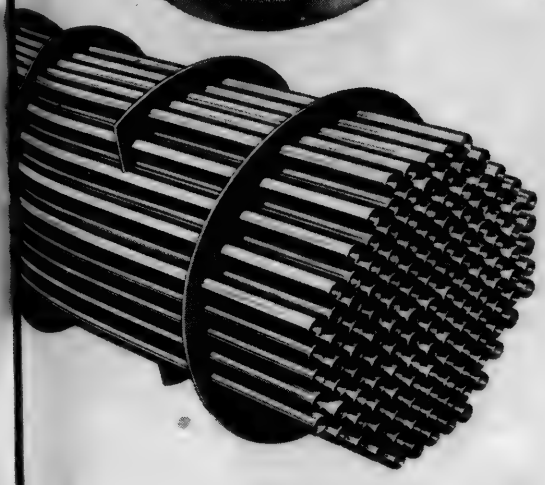
Normal figures in this table are based on a 30-year period covering 1921 to 1950, inclusive, as compiled and published by the U. S. Weather Bureau.

Figures in this table, with two exceptions, based on local weather bureau reports. Exceptions are Utica and Lewiston, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y., and Norman E. Ross, Bursar, Bates College, Lewiston, Me., respectively. Anaconda, Bozeman, Butte, Deer Lodge and Livingston, Mont., through the courtesy of the Montana Power Company. Tacoma figures through the courtesy of the Tacoma News Tribune.

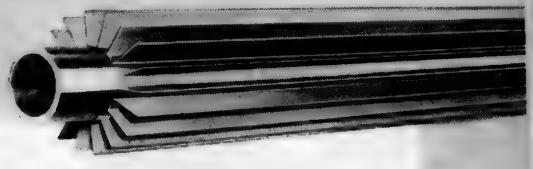
[Table concluded on page 134]





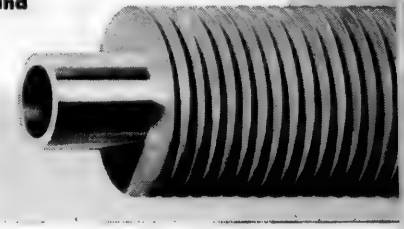


TWO GOOD WAYS TO ADD ADDITIONAL HEAT TRANSFER SURFACE AREA TO B&W CARBON STEEL ERW TUBES



(A) Longitudinal Channels Welded On

(B) Continuous Helical Fin Wound Around Tube and Welded On



TUBING REQUIREMENTS FOR HEAT TRANSFER EQUIPMENT

The economy and usefulness of pressure tubing in heat exchanger and condenser applications depend on the tubing's heat transfer ability and the ease with which it can be bent, coiled, swaged, and rolled into tube sheets.

Because of its uniform wall thickness, the heat transfer ability of B&W Electric-Resistance-Welded Carbon Steel Tubing is the optimum for such a ferrous material. It is an economical material to use, not only because of its reasonable first cost, but also because of its low fabrication cost, since ease of bending, coiling, swaging, and rolling into tube sheets is provided through quality-controlled methods used in its manufacture.

B&W Electric-Resistance-Welded Carbon Steel Heat Exchanger and Condenser Tubing is widely used in the process industries, including petroleum refining and chemical processing, and in refrigeration and steam generating equipment. If carbon steel tubing can do the job required, you will find B&W ERW Tubing provides maximum, trouble-free service life. For additional information, call on Mr. Tubes, your nearby B&W Tube Representative — *or write for Bulletin 412.* The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

TA 6099 PG-2

Seamless and welded tubular products, seamless welding fittings and forged steel flanges—in carbon, alloy, and stainless steels

Degree-Days for February, 1957 (Concluded)

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING'S 29th Year of Publication of Monthly Degree-Day Data

City	February			Season to February 28, incl., from Sept. 1		
	1957	1956	Normal	1956-57	1955-56	Normal
Los Angeles, California (C)	146	338	244	685	1096	1023
Louisville, Kentucky (A)	644	680	778	3102	3485	3444
Lynchburg, Virginia (A)	610	667	722	2932	3359	3193
Macon, Georgia (A)	199	288	391	1303	1886	1712
Madison, Wisconsin (A)	1047	1215	1207	5156	5439	5331
Marquette, Michigan (C)	1241	1229	1291	5748	5672	5737
Memphis, Tennessee (A)	414	492	574	2171	2638	2547
Meridian, Mississippi (A)	(a)	304	413	(a)	2027	1930
Milwaukee, Wisconsin (A)	1036	1153	1142	5034	5111	5089
Minneapolis, Minnesota (A)	1241	1444	1310	5599	6422	5862
Moline, Illinois	902	1096	1075	4590	5001	4797
Montgomery, Alabama (A)	198	268	388	1298	1890	1769
Nashville, Tennessee (A)	487	518	636	2377	2986	2786
New Haven, Connecticut (A)	875	927	1005	4166	4255	4263
New Orleans, Louisiana (C)	101	145	223	621	1040	993
New York, New York (C)	774	814	904	3473	3717	3670
Newark, New Jersey	795	833	932	3628	3835	3883
Norfolk, Virginia (A)	564	546	644	2244	2770	2630
North Platte, Nebraska (A)	903	1147	1016	4770	5441	4851
Oak Ridge, Tennessee	438	498	689	2170	3126	3110
Oakland, California (A)	361	699	400	2092	2250	2029
Oklahoma City, Oklahoma (A)	543	699	630	2837	3177	2840
Omaha, Nebraska (A)	904	1121	1058	4362	5093	4728
Parkersburg, West Virginia (C)	706	737	826	3307	3750	3599
Peoria, Illinois (A)	847	1014	1028	4247	4661	4580
Philadelphia, Pennsylvania (C)	710	764	837	3140	3451	3394
Phoenix, Arizona (A)	117	402	275	1068	1132	1255
Pittsburgh, Pennsylvania (C)	757	808	879	3469	3869	3761
Pittsfield, Massachusetts	1070	1165	1212	5316	5528	5415
Pocatello, Idaho (A)	929	1308	1022	5317	5106	6082
Portland, Maine (A)	1062	1166	1218	5430	5383	5367
Portland, Oregon (C)	589	793	594	3281	3259	2985
Providence, Rhode Island (A)	866	941	1019	4272	4379	4339
Pueblo, Colorado (A)	643	1070	865	3796	4188	4248
Raleigh, North Carolina (A)	495	548	577	2347	2896	2434
Rapid City, South Dakota (A)	1042	1180	1151	5241	5607	5314
Reading, Pennsylvania (C)	785	815	902	3613	3828	3785
Red Bluff, California (A)	371	538	423	2012	2054	1982
Reno, Nevada (A)	724	1077	804	4482	4333	4190
Richmond, Virginia (A)	600	631	708	2749	3205	3068
Rochester, New York (A)	979	1101	1148	4676	4985	4870
Roswell, New Mexico (A)	357	795	566	2502	2824	2768
Sacramento, California (C)	328	486	403	1978	1866	1997
St. Joseph, Missouri (A)	827	978	820	3974	4528	3646
St. Louis, Missouri (C)	667	776	792	3266	3649	3478
Salt Lake City, Utah (A)	685	1115	885	4337	4248	4358
San Antonio, Texas (A)	126	275	293	1000	1295	1355
San Diego, California (A)	146	327	247	673	1062	1042
Sandusky, Ohio (C)	912	979	997	4068	4392	4235
San Francisco, California (C)	302	390	336	1600	1787	1679
Sault Ste. Marie, Michigan (A)	1344	1348	1442	6348	6224	6369
Savannah, Georgia (A)	193	205	330	1146	1650	1429
Scranton, Pennsylvania (A)	946	1007	1028	4597	4792	4423
Seattle, Washington (C)	634	768	602	3287	3457	3037
Sheridan, Wyoming (A)	1093	1256	1170	5428	5867	5607
Shreveport, Louisiana (A)	249	319	386	1498	1811	1784
Sioux City, Iowa (A)	1008	1251	1170	4901	5699	5301
Spokane, Washington (A)	1011	1223	988	5297	5404	4936
Springfield, Illinois (A)	799	953	907	3947	4429	4021
Springfield, Missouri (A)	622	775	790	3250	3752	3624
Syracuse, New York (A)	965	1095	1117	4680	5007	4682
Toledo, Ohio (A)	934	1040	1056	4433	4877	4617
Topeka, Kansas (C)	771	898	851	3640	4163	3830
Trenton, New Jersey (C)	783	806	904	3554	3807	3760
Tulsa, Oklahoma	505	653	644	2701	3062	2882
Utica, New York (O)	1122	1127	1181	5316	5196	4966
Valentine, Nebraska (A)	1034	1318	1100	5205	5929	5170
Walla Walla, Washington (C)	751	1062	748	4171	4277	3737
Washington, D. C. (C)	652	677	770	2988	3309	3258
Wichita, Kansas (A)	705	851	778	3472	3858	3564
Williston, North Dakota (C)	1391	1516	1442	6537	7388	6642
Winnemucca, Nevada (A)	741	1047	854	4846	4617	4602
Yakima, Washington (A)	904	1218	862	4995	5315	4512

For footnotes, see page 132.

Your Company Got the BENDS?

If you've got the bends... pipe bends, that is... stop and think a moment about this: ADSCO Expansion Joints will do a better job because of...

● ***LESS HEAT LOSS.*** A 12-inch line 1000 feet long, carrying steam at 200 lbs. and 550 F. will lose 16% more heat if bends are used instead of ADSCO Expansion Joints.

● ***LESS PRESSURE DROP.*** The same line will have a 28% greater pressure drop with bends than with ADSCO Expansion Joints.

● ***LESS SPACE.*** One pipe bend requires 50 or 100 cubic feet of valuable space. ADSCO Expansion Joints require no extra space.

● ***LOWER COST.*** Used to absorb 4 inches of expansion per 150 feet of 12-inch pipe, an expansion bend, or loop, will cost 50% to 100% more than an ADSCO Expansion Joint. Similar savings will result from the use of ADSCO Expansion Joints in other sizes of pipe lines.

If you are planning construction of a pipe line or modernization of an existing one with bends, ADSCO invites inquiries on the use of Corruflex Packless or Slip-type Expansion Joints.

Write for Bulletins 54-10PR and 35-51-PR.

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NEWS OF THE MONTH

ASHAE-AIA JOINT COMMITTEE

Appointed to encourage greater cooperation between engineers, architects, and air conditioning industry.

The American Society of Heating and Air-Conditioning Engineers and the American Institute of Architects have appointed a joint committee to encourage greater cooperation between consulting engineers, architects and the air conditioning industry. John E. Haines, past president of ASHAE from Minneapolis, Minn., and Paul Schell, AIA member from Pittsburgh, Pa., were appointed co-chairmen at a recent organizational meeting.

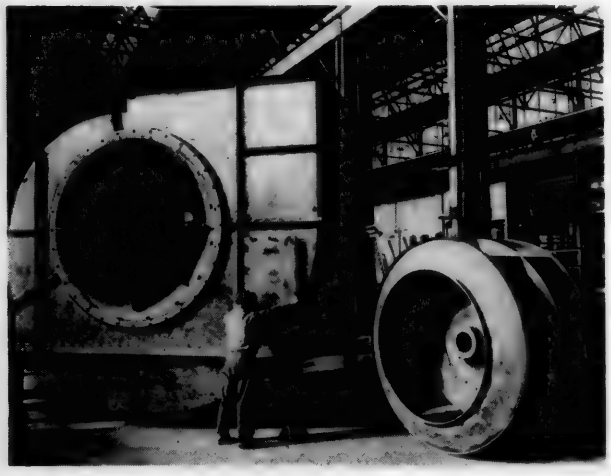
• **COMMITTEE REPRESENTATIVES**— Additional ASHAE committee representatives are Cary B. Gamble, New Orleans, La.; Hermann C. Hoffmann, Syracuse, N. Y.; recently-elected President Peter B. Gordon, New York. N. Y., and John Everetts, Jr., Philadelphia. Pennsylvania.

AIA members include James B. Newman, New York. N. Y.; George S. Idell, Philadelphia, Penna.. and Angelo R. Clas, Washington, D. C.

• **SUBJECTS ASSIGNED**—At the meeting committee members were assigned subjects for study and development to provide information of mutual interest. Haines and Hoffmann of ASHAE are to compile data on the cost for and benefits from air conditioning commercial and industrial new buildings.

Standards for air conditioning buildings, as determined by geographical area, type of building, use and occupancy, are to be developed by Gamble, Gordon and Everetts of ASHAE. This information is to include facts about temperature, humidity, cleanliness, air movement and noise levels. Cautionary details also will be given on the effect of light loads, window areas and insulation on the cost and effectiveness of air conditioning.

Additional costs for the installation and operation of an air conditioning system in buildings with large glass areas will be investigated by Hoffmann of ASHAE and Schell of AIA. They will use typical building sections as examples.



TUNNEL FAN UNIT

First of 32 high-powered supply and exhaust fans for ventilating the Baltimore Harbor Tunnel is shown at the plant of American Blower Division of American-Standard, Dearborn. Twelve fresh air, 12 exhaust fans, and 8 standby units will be housed in 2 ventilation buildings. With 8-ft dia wheel, each fan is driven by 2 G.E. induction motors, one rated at 450 hp for peak load, the other a 2-speed unit, rated at 128 and 17 hp. Full capacity of system is nearly 3 million cfm.

PUBLIC UTILITY SURVEY

reports air conditioning increases as well as predictions of consistent future growth.

Substantial gains in air conditioning with predictions of consistent future growth are reported in a survey of public utilities completed by The Trane Company, La Crosse, Wis.

• **RESULTS**—From responses received after querying 50 power companies and water departments in leading cities across the country, the following facts are apparent:

1. Every company participating in the survey reported marked increases in the installation of air conditioning in its area, as measured through tons of refrigeration on its lines.

2. The degree of increase was more pronounced in the South, but the difference between other land areas of the country was not great, indicating that outside temperature alone is not responsible for the growth of air conditioning.

3. Central air conditioning systems are becoming increasingly popular for residence applications.

4. Commercial and industrial air conditioning are becoming a competitive necessity in many parts of the country.

5. Power and water companies expect an upsurge in the use of air conditioning in the years ahead and many are making plans now to meet the increasing demand on their facilities.

• **SURVEY HIGHLIGHT**— One highlight of the survey was the developing trend towards air conditioning in areas not normally regarded as outstanding markets because of their mild climates.

For example, air conditioning installations in northern and central California showed a sharp increase for 1956 over figures for 1955. O. R. Doerr, vice president of Pacific Gas and Electric, said, "Until recently, it was rather generally assumed that the San Francisco Bay area needed no air conditioning because of the relatively low summer temperatures. Three of the newest 8 to 12-

(*Continued on page* 138)

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Novelty has combined its fifty years of building unfired pressure vessels and storage tanks—with ten years of developing a complete line of Novelon Linings to bring you vessels that will give you corrosion protection available heretofore only with expensive alloys and clads.

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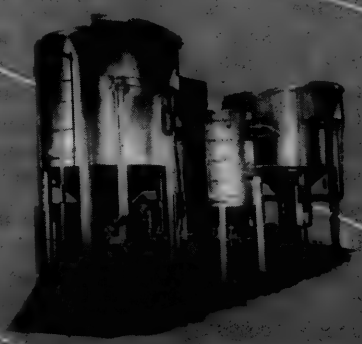

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CLARE AND KLOMAN STREETS • PLAZA 2-0425 • BALTIMORE 30, MARYLAND

Representatives in Major Cities

(*Continued from page* 136)

story buildings now planned for downtown San Francisco will be completely air conditioned, however; and it appears that there will be a market for commercial air conditioning in our major office buildings from now on."

Another example came from Seattle. Here, the Seattle Department of Lighting reported, "Although the Seattle area seldom experiences excessive summer temperatures, there are many cases where the internal heat load of a building makes air conditioning mandatory. These internal heat loads are human heat loads of occupants, lighting and cooking heat, and heat of service machinery motors." Replies to the survey were made by Paul J. Raves, superintendent of lighting, and J. D. Gawne, electric sales supervisor.

VALUE OF AIR CONDITIONING

in new homes financed under FHA program discussed by industry advisory committee.

How much value does an air conditioning system add to a new home? Representative air conditioning equipment manufacturers and home builders met with Federal Housing Administration officials March 6 and discussed this and other questions posed by the expanding use of air conditioning in homes financed under the FHA program. FHA Commissioner Norman P. Mason called the industry advisory committee to Washington to brief FHA on new developments in air conditioning, the effect of operating costs on home owners' housing budgets and the need for reliable data to evaluate uniformly the worth of the many manufactured brands of equipment of varying types and capacities.

• **MANUFACTURER'S REPORT**—A report by the manufacturers assured housing officials that performance ratings could soon be published to serve as guides in determining the relative merits of different types of equipment.

Operating and maintenance cost data based on actual case histories of residential air conditioning systems were presented to FHA by the committee who had assembled the cost figures in several key areas. The surveys were based on actual costs per metered kilowatt hour plus maintenance and repair bills for the air conditioning systems. Results of the cost samplings were low enough to allay apprehension that home air conditioning imposed an overly heavy burden on the family housing budget.

• **RATING YARDSTICK**— As to the yardstick to be used in rating equipment performance, it was indicated that the standards of relative efficiency of various types of equipment would be based on watt input and Btu rating under a standard condition rather than on the more commonly used tonnage or horsepower rating.

• **APPRAISAL**— As to appraising the value of air conditioning to the home owner, Commissioner Mason said variable factors affect value, demand, and public acceptance from place to place and from time to time. He told the equipment men that wherever the public was convinced of the value, air conditioning would have value, and FHA would give it full credit in its appraisals.

The amount that can be borrowed to buy a home under the FHA plan is determined by FHA's appraisal of value. Builders and equipment manufacturers have held that FHA appraisals often did not reflect full value of an air conditioning system. The committee members agreed that much progress has been made in resolving past differences. "We're not very far apart. We're much closer than we were a year ago," was the consensus.

P. B. GORDON ELECTED

president of ASHAE at 63rd Annual Meeting Held in Chicago; registration exceeds previous records

Peter B. Gordon was elected president of the American Society of Heating and Air-conditioning Engineers at the 63rd annual meeting of the society held at the Conrad Hilton Hotel, Chicago, February 25 to 28. Other officers elected are Elmer R. Queer, University Park, Pa., first vice president; Arthur J. Hess, Los Angeles, Calif., second vice president, and Charles H. Pesterfield, East Lansing, Mich., treasurer.

• **COUNCIL AND RESEARCH**—The new members of Council elected for a three-year term are: P. N. Vinther, Dallas, Tex.; William G. Hole, Montreal, Canada; Peter J. Marschall, Chicago, Ill.; Wesley O. Stewart, Los Angeles, Calif.

The new members on the Committee on Research to serve for a three-year term are Dominic D'Eustachio, Pittsburgh, Pa., Elbert S. Howarth, New Kensington, Pa., Howard R. Limbacher, Kalamazoo, Mich., Edwin P. Snyder, Minneapolis, Minn., and John I. Trimble, Columbus, Ohio.

The society's coveted F. Paul Anderson medal was awarded to M. K. Fahnestock, research professor of mechanial engineering and chairman of the Physical Environment Unit of the University of Illinois.

• **PROGRAM**—Technical sessions were held in the morning so as to permit attendance at the 13th International Heating and Air Conditioning Exposition which was held at Chicago's International Amphitheatre. In all, the program consisted of two symposiums and the presentation of thirteen papers.

There were over 3,250 members and guests registered at the convention and this tops all registration figures for previous annual meetings of the society.

Papers presented follow:

Study of Three Redwood Cooling Tower Packings, by W. W. Smith

Earth as Heat Source and Sink for Heat Pumps, by D. M. Vestal, Jr., and B. J. Fluker

From '36 to '56; Air Conditioning Comes of Age, by W. A. Grant

Revised Winter Outside Design Temperatures, by H. C. S. Thom

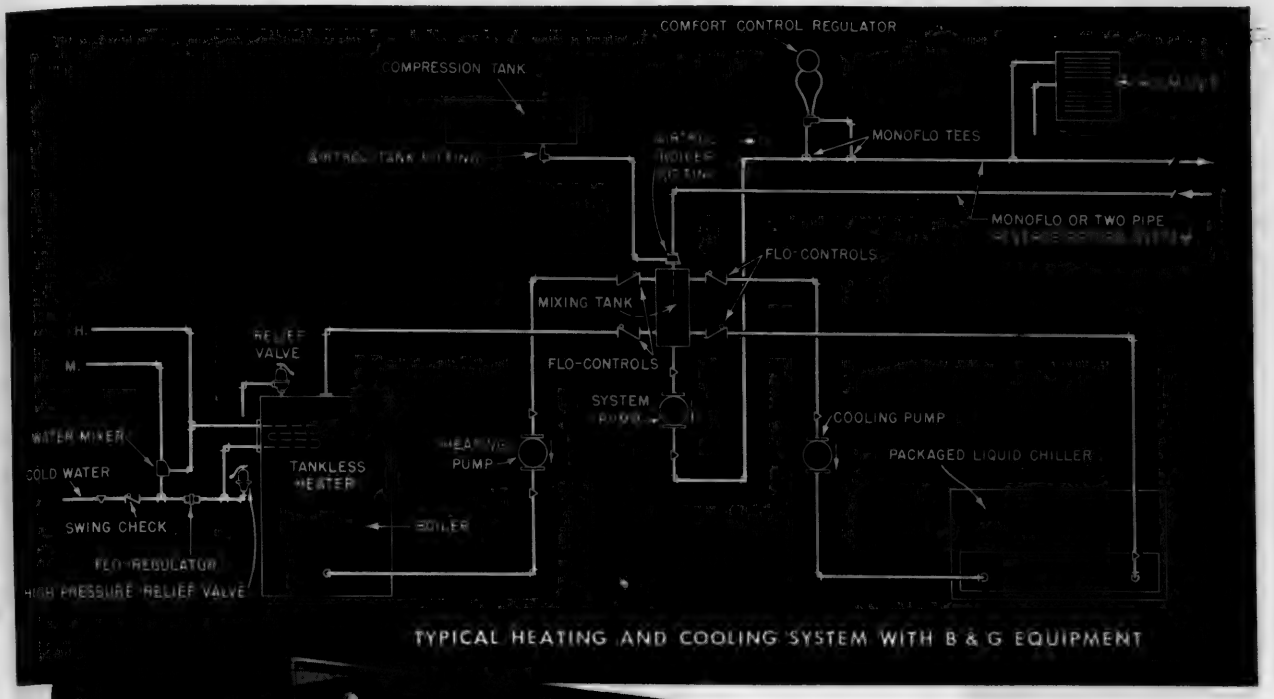
Pulsations in Residential Heating Equipment—Preliminary Results, by A. A. Putnam and W. R. Dennis

The Dust Spot Method for Evaluating Air Cleaners, by K. T. Whitby, A. B. Algren and R. C. Jordan

Cold Wall Effects in a Ceiling-Panel-Heated Room, by L. F. Schutrum and T. C. Min

Performance of Covered Hot Water Floor Panels, Part

(*Continued on page* 140)



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7½ TO 100 TONS CAPACITY

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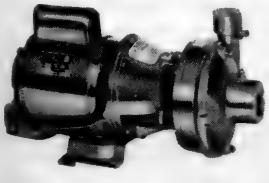
cooling package

The B&G Package Liquid Cooler offers an impressive array of features for more efficient performance and easier installation. For example, the low pressure drop through the evaporator permits a substantial reduction in system pump sizes. The evaporator is under the compressor, for a lower center of gravity, easier installation and service. Pump-down is non-recycling...and an integrated electrical control system provides a high degree of automation without extra cost. Wiring is complete, including that of the chiller and tower pump.

This is a B&G Product...built to the high standards which make the B&G label a warranty of satisfaction.

COMPLETE RANGE OF AIR CONDITIONING AND REFRIGERATION COMPONENTS



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air diffusers • filters • exhausters

(*Continued from page* 138)

II, by E. L. Sartain and W. S. Harris

Outlet Characteristics that Affect Downthrow of Heated Air Jets, by Linn Helander, Shee-Mang Yen and Wilson Tripp

Air Flow in Free Convection Over Heated Bodies, by T. F. Hatch and D. Barron-Oronzco

Radioactive Process Ventilation, by S. H. Glassmire, Jr., and J. B. Wahlen

• **EXPOSITION**—Never in the history of the industry, was there ever as comprehensive a show of new developments and trends as that staged in the International Amphitheatre. Not only was this the greatest show in the number of exhibits, but also in the scope of products on display.

In all, there were 472 exhibits ranging from small units to large refrigeration machines. Practically, all of the exhibit space was utilized and attendance was clocked at an all-time high.

BUILDING RESEARCH INSTITUTE

to feature ten major technical sessions at Sixth Annual Meeting to be held in Chicago.

A report on Panel Cooling and Heating Research will be given by Lester F. Schutrum of the ASHAE Research Laboratories as one of ten technical sessions scheduled for the Building Research Institute Sixth Annual Meeting to be held in the Drake Hotel, Chicago, April 15 to 17, 1957.

• **ASHAE STUDY**—Since 1952, the ASHAE Research Laboratories in Cleveland have had under study a test room constructed with walls, floor and ceiling which can be independently panel heated or cooled in various combinations. The ceiling can be raised or lowered to effect different ceiling heights. Mr. Schutrum will talk on the results of these studies on Tuesday afternoon, April 16.

• **OTHER TECHNICAL SESSIONS**—Other technical sessions scheduled for the Building Research Institute Sixth Annual Meeting include Machine Application of Materials at the Site, New Paints and Methods of Painting, Construction in Chicago's Future, Weatherproofing the Building Shell, Full Scale Mock-Ups in Architectural Design, Making a Home of a Modern House, Building Research in the Chicago Area, Household Appliances in 1962, and Multi-Story Apartment Buildings.

• **REGISTRATION**—Registration should be made to Hal C. Farrell, Secretary to the Institute, 2101 Constitution Avenue, Washington 25, D. C.

GROUND-BREAKING

ceremonies for new Engineering Center highlighted by address of former President John W. James.

Groundbreaking ceremonies were held for the million-dollar Research Park Engineering Center to be built in suburban Johnstown, Pa., by National-U. S. Radiator Corporation. The first spadeful of earth was turned with

(*Continued on page* 142)

YOUR BIGGEST AIR CONDITIONING PROBLEM:

*Rising prices! Cost per cubic foot of air conditioning ducts and building space has tripled since 1930!**

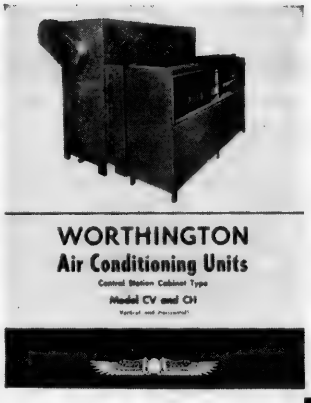
YOUR MOST URGENT AIR CONDITIONING NEED:

An air handling unit which meets all design and functional objectives yet requires only a minimum amount of space!

YOUR BEST AIR CONDITIONING SOLUTION:

New WORTHINGTON central station units that offer unlimited choice of location!

FREE DATA BOOK!
Gives you all the facts to figure the job with the most compact, adaptable air handling units ever developed!



Included are photos of units, engineering and design features, specifications, physical data . . . *plus*

Direct Expansion Coil Data • Selecting the Correct Unit with Direct Expansion • Sample Water Cooling and Water Heating Problem • Psychrometric Chart • Heat Control of Dry Air • Log Mean Temperature Chart • Mean Effective Temperature Tables • Correct Fan Selection—Sample Problem and Fan Data • Dimensional Drawings

This fact-filled, easy to use Worthington 52-page Data Book is a "must" for every architect, engineer, contractor and builder! Send for your copy today.

*Architectural Record, May 1956.

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no moving parts!
attractive—compact!

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SIMPLY AMAZING PERFORMANCE!

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A few areas are open for Manufacturer's Representatives. Write for information.

(*Continued from page* 140)

a silvered shovel by L. N. Hunter, senior vice president who will be director of the Center.

The ceremony followed a luncheon at which John W. James, then president of ASHAE gave the principal address.

• **NEED TO EDUCATE PUBLIC**—Mr. James reported that city workers spend 94%, commuters 77%, and farmers 40% of their time in artificial atmospheres. "This, he said, points up a real need for better heating and air conditioning in homes, offices, factories and in public transportation everywhere." Mr. James continued, "that people recognize this need, but do not know that so much has been done to make it a reality." He remarked that little or nothing has been published for general consumption regarding studies made over the past 37 years on the effect of temperature and humidity. These studies have brought about the knowledge that there is a difference of 15 deg between the skin temperature of the feet and that of the head. "Body temperature varies too, he said, from 99 deg down to 96.5 deg every day in a perfectly well person. Proper control of indoor temperature, both summer and winter, helps us to compensate for these variations.

"Industry has not kept the public up-to-date on what is available, and on what research, such as that to be carried out in this new Center, will ultimately make possible. Adequate heating and air conditioning will, in the foreseeable future, be as much a part of our homes, offices and factories as electricity is today. This new Center will make available an atmosphere of challenge to engineers and scientists, pooling their collective intelligence, to hasten the day when universal year around indoor comfort is a reality."

• **BUILDING DESIGN FLEXIBLE**—The building utilizes probably the most flexible design ever devised for such a structure. Interior walls will be literally movable. Outside walls on all sides are to be made up of individual window-panel units. Additional panels can be added when the Center is enlarged without serious alteration, and without in any way detracting from the Center's simple modern lines.

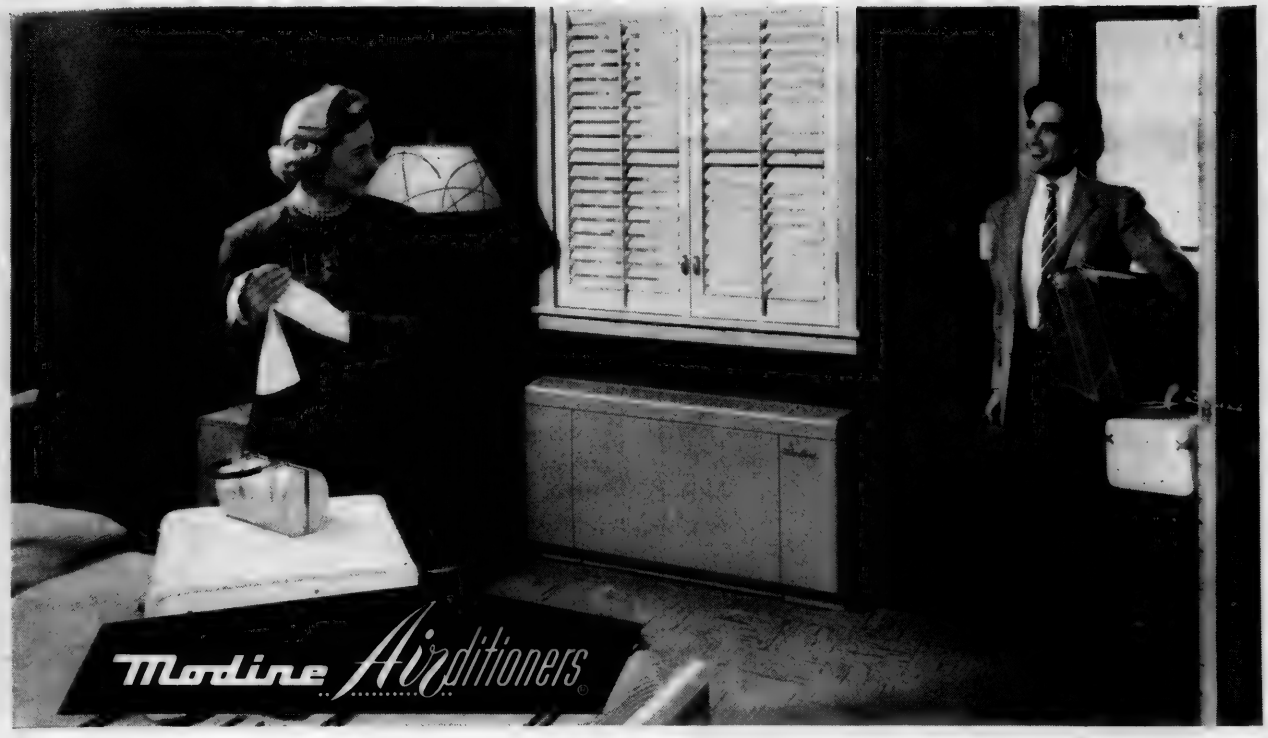
LOS ANGELES EXHIBIT

is first air conditioning, heating, ventilating, and refrigeration show and conference for West.

Exhibitors already committed to space in the Western Air Conditioning, Heating, Ventilating and Refrigeration Exhibit and Conference scheduled for May 4-8, 1957, in Los Angeles are enthusiastic about the show's potentials, announces its sponsor, Western Air Conditioning Industries Assn.

Statistics gathered from a number of national trade shows evidence that a very small percentage of the total attendance travel more than 1000 miles. Thus, they feel, participation in a good regional exhibit gives the oppor-

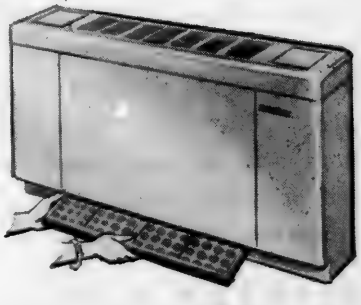
(*Concluded on page* 144)



Personalized year-round comfort...

better—at lower annual cost

You get *all* of the inherent benefits of a fan-coil unit air conditioning system with Modine AIRditioners. Compare them on these *five major economy considerations*—and you'll see why beautifully-styled AIRditioners are first choice for both new building and remodeling.



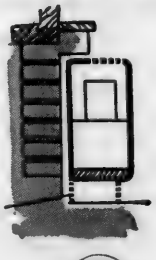
1. Quieter operation. Resiliently suspended Modine fans operate at 1050 rpm top speed. The result —maximum quietness.

2. Lower maintenance costs. AIRditioners have permanently-lubricated motors that never need oiling.

3. Faster installation. AIRditioners are furnished with reversible coils, provision for right- or left-hand piping and wiring, generously sized end sections that do not cramp the installer.

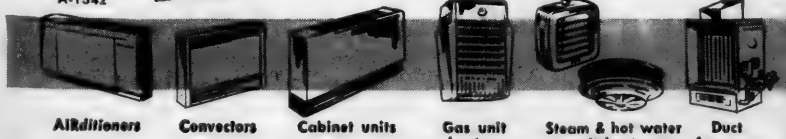
4. Easier filter changing. With AIRditioners you merely tilt the filter rack and *slide* out the filter. No need to loosen or remove the front panel.

5. Easier recessing. Square corners simplify recessing—up to 5 inches, with less than 6 inches protruding into the room.



You can choose from console, concealed, overhead or ceiling types in all popular sizes. For facts, see the Modine representative listed in your classified phone book, or write for Bulletin 755 to Modine Mfg. Co., 1511 DeKoven Ave., Racine, Wis.

A-1342

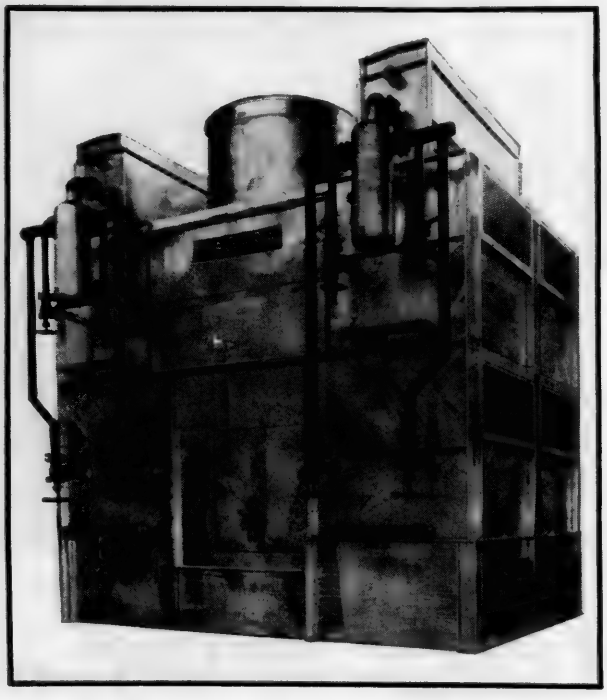


AIRditioners | Convectors | Cabinet units | Gas unit heaters | Steam & hot water unit heaters | Duct furnaces

In Canada: Sarco, Ltd., Toronto

Modine
MANUFACTURING COMPANY

Large refrigeration plants save money with NIAGARA high efficiency condensers



In size ranges from 100 to 450 tons refrigeration Niagara's "Super" Condensers save power, save large cooling water and water handling expenses and help the user avoid most of the upkeep problems and troubles of a refrigerating plant. Always full condensing capacity is assured by the "Duopass" pre-cooling coils which remove the superheat and bring about condensing at low temperatures. Complete accessibility assures labor saving, inexpensive upkeep.

NIAGARA BLOWER COMPANY

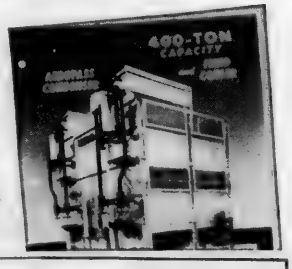
Dept. HV-4, 405 Lexington Avenue

NEW YORK 17, N. Y.

District Engineers in Principal Cities

Write for complete information.

Ask for Niagara Condenser Bulletins 123 and 131.



NIAGARA *Over 40 Years' Service in Industrial Air Engineering*

(*Concluded from page* 112)

equipment, then steps should be taken to include the sump pumps in this case on the emergency circuit.

The sump pump and its component piping must be installed in a manner that conforms with the requirements of the local plumbing authorities.

Watertight Sleeves

Drainage lines penetrating the building wall on its route to the street sewer facilities should also be installed in a watertight manner. This is accomplished through the use of watertight sleeves. Figure 8 illustrates two of the several types of sleeves available for this purpose.

Detail *A* shows the type of a sleeve that can be fabricated on the site. It consists of a piece of pipe of sufficient diameter to allow the drainage line to pass through it. A baffle is welded to this pipe to prevent any seepage of water around the sleeve itself. The void between the inside of the pipe sleeve and the outside of the drainage line is packed with oakum and lead or mastic compound to complete the watertight connection. The wall plate shown on the interior of the building wall is for the purpose of appearance only.

The sleeve shown in Detail *B* is of a type manufactured expressly for this purpose. It consists of a piece of pipe with hub joints at either end. After the installation is made, the joints are packed with oakum and lead or mastic compound. The wall plate shown is for the purpose of appearance only.

Other types of sleeves are also available for this use, and it is up to the engineer to select the type of sleeve he feels will best suit his needs. When confronted with installations that must operate at sites where ground water conditions exist, it is hoped that the suggestions outlined will be of some help.

News of the Month

(*Concluded from page* 142)

tunity of reaching a quality audience in a market area equivalent to a national show.

• **ACTIVE PROMOTION**—A concentrated advertising, promotion, publicity and direct mail program is being designed to reach architects, builders, contractors, engineers, building management, owners and operators of hotels, motels, restaurants, industrial plants, and retail establishments, dealers and distributors and homeowners specifically known to be interested in renovating or building.

The latest in equipment available for air conditioning, heating, ventilating or refrigeration will be on display, covering both industrial and domestic applications.

• **CONFERENCES PLANNED**—In addition to equipment exhibits, the Association is planning a series of conference sessions. Authorities in various types of applications will be available to discuss specific installations.

Information regarding the program may be obtained from Fred J. Tabery, Exhibit Manager, 3443 So. Hill Street, Los Angeles 7, California.

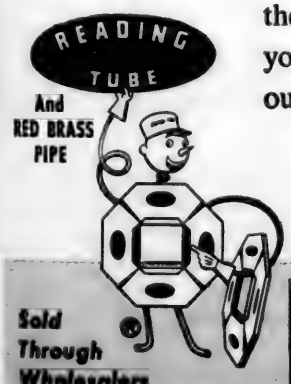
Prescription for Modernization Crisis:

One of a Series

"You're going to pay for the rent of this elephant! If you had specified READING Copper Tube my new shower would be working by now!"

Know where you're heading— Insist upon READING!

Our every facility is concentrated on the production of tubing, *and tubing alone,* from raw material to finished product. Our many depots throughout the country assure you of the *exact* tubing you want, in the *exact* quantity you want, *exactly* when you want it. Enjoy the satisfaction resulting from our personalized "Shirt-Sleeve Service"!



READING TUBE CORPORATION

Empire State Building, New York 1, N. Y. • Plant: Reading, Pa.

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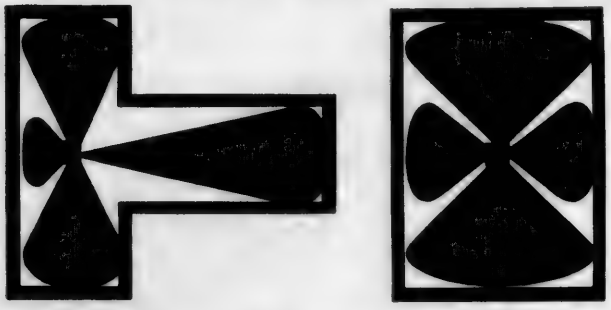
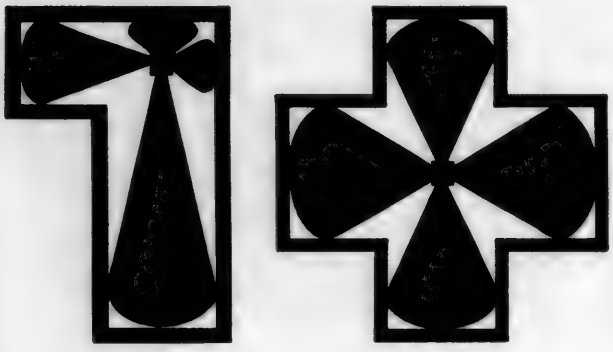
Distribution Depots: READING, PA. · WOODSIDE, L.I., N.Y. 57-17 Northern Blvd. · CHICAGO, ILL. 724 W. 50th St. · DALLAS, TEXAS 9000 Sovereign Row Brook Hollow Industrial District · HOUSTON, TEXAS 1121 Rothwell St. · OAKLAND, CALIF. 410 Hegenberger Road · LOS ANGELES, CALIF. 120 No. Santa Fe Ave. · DENVER, COLO. 2845 Walnut St. · CLEVELAND, OHIO 4615 Perkins Ave. · ATLANTA, GA. 660 Murphy Ave. S.W., Unit 5, Bldg. B

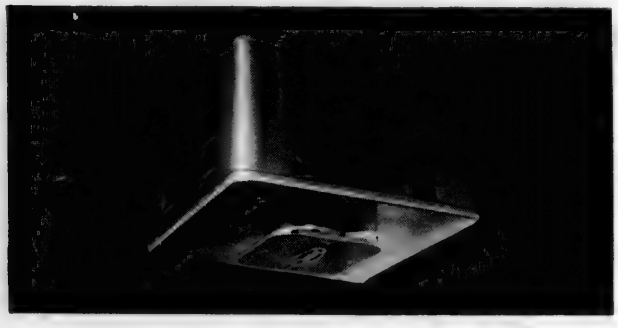
How one "Clover Leaf"



does the work



of two or more conventional heaters



Just one of Carrier's exclusive "Clover Leaf" Unit Heaters with variable 4-way air distribution effectively heats up to 8000 square feet of floor area. Carrier's greater, more flexible coverage means fewer units are needed, resulting in impressive savings in first cost, installation and upkeep. For steam or hot water, in 8 sizes: 55,000 to 600,000 Btu/hr.

For a complete catalog on the "Clover Leaf," call your Carrier manufacturer's agent. Look in the Classified Telephone Book under "Heaters—Unit." Or write Carrier Corporation, Dept. UH, Syracuse, New York.

Complete Line of Unit Heaters. Over 50 years' leadership in temperature control! Carrier knows heating!

Carrier

industrial heating • air conditioning • refrigeration

Canadian Degree-Days for February, 1957*

City	February 1957	February Normal**	Cumulative 1956-57	Cumulative Normal
Calgary, Alta.	1423	1350	6826	6540
Charlottetown, P.E.I.	1249	1370	5817	5680
Crescent Valley, B. C.	1167	1080	6025	5660
Edmonton, Alta.	1518	1520	7170	7370
Fort William, Ont.	1540	1580	7500	7370
Grande Prairie, Alta.	1656	1600	7718	7720
Halifax, N. S.	1037	1180	4806	4955
London, Ont.	1093	1210	5125	5210
Medicine Hat, Alta.	1391	1380	6476	6380
Moncton, N. B.	(a)	1380	(a)	6000
Montreal, P. Q.	1234	1430	5976	6060
North Bay, Ont.	1307	1530	6254	6860
Ottawa, Ont.	1252	1450	6167	6300
Penticton, B. C.	1093	960	5286	4740
Prince George, B. C.	1487	1320	7561	6650
Quebec City, P. Q.	1318	1510	6664	6660
Regina, Sask.	1620	1680	7839	7770
St. John, N. B.	1193	1310	5925	5880
Saskatoon, Sask.	1654	1710	7952	7950
Timmins, Ont.	1476	1680	7720	7870
Toronto, Ont.	980	1147	4691	4918
Vancouver, B. C.	819	740	4174	3750
Victoria, B. C.	750	660	3953	3430
Windsor, Ont.	1010	1100	4579	4760
Winnipeg, Man.	1686	1714	7808	7737

* These data are supplied through the courtesy of the Meterological Division Air Service Branch, Department of Transport, Canada.
** New normal figures covering 30-year period, 1921 to 1950.
(a) Data not available.

COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available

GAMA MEETING—Annual meeting of the Gas Appliance Manufacturers Association, at The Greenbrier, White Sulphur Springs, West Va. H. Leigh Whitelaw, managing director of the Association, 60 E. 42nd St., New York, N. Y. ..... **APRIL 8-10, 1957**

OIL BURNING CONFERENCE—A national conference on oil burning and its equipment, sponsored by the Oil Heat Institute of America, and the mechanical engineering department at NYU, at the Gould Student Center, New York University, University Heights, Bronx, New York. C. F. Curtin, secretary of the Institute, 500 Fifth Ave., New York 36, N. Y. ..... **APRIL 15-17, 1957.**

WARM AIR HEATING SHORT COURSE—1957 Warm Air Heating Short Course, sponsored by Purdue University, West Lafayette, Ind., to be held at the University. Prof. F. B. Morse, School of Mechanical Engineering, Purdue University, West Lafayette, Ind. ..... **APRIL 15-18, 1957.**

AIHA CONVENTION—Annual convention of the American Industrial Hygiene Association, at the Sheraton Jefferson Hotel, St. Louis, Mo. Secretary of the association, 4400 Fifth Ave., Pittsburgh 13, Pa. ..... **APRIL 22-26, 1957.**

ENVIRONMENTAL ENGINEERS MEETING—Annual technical meeting of the Institute of Environmental Engineers, at the La Salle Hotel, Chicago, Ill. H. F. Sander, president of the Institute, Vapor Heating Corp., 6420 West Howard St., Chicago Ill. ..... **APRIL 25-26, 1957.**

WARM AIR TECHNICAL CONFERENCE—Second annual technical conference, National Warm Air Heating and Air Conditioning Association, Hotel Cleveland, Cleveland, Ohio. George Boedener, Secretary, NWAHACA, Cleveland Ohio ..... **MAY 1-2, 1957.**

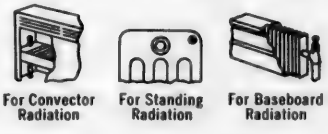
(*Concluded on page* 148)

HOFFMAN WATER VENTS

FOR RESIDENTIAL, INDUSTRIAL AND PROCESS APPLICATIONS

VENT THE AIR AUTOMATICALLY FROM HOT AND CHILLED WATER SYSTEMS WITH PRESSURES UP TO 150 P.S.I.

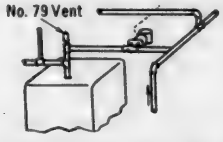
NO. 500 WATER VENT



This Hoffman Disc type valve vents all systems automatically! Adjusts for manual, steam or hot water venting. Valve can be cleaned of leak-sealing compounds or minerals without draining the system. Hygroscopic Fibre Discs automatically open to allow air to vent, close against steam or water. Selector screw controls venting rate. Sizeconn.: ⅛". Max. wtr. press.: 50 P.S.I.

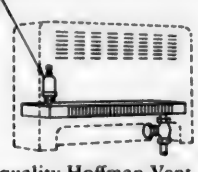
NO. 79 WATER VENT

WILL WITHSTAND HYDROSTATIC PRESSURES OF 200 P. S. I.



Designed for use on hot or cold water mains and process applications, this Hoffman Water Vent positively removes air from the piping of any water system. Tapped at top for ¼" I.P.S. safety drain connection for discharging moisture entrained in the vented air. Size conn.: ¾" Male, ½" Female. Max. oper. press.: 75 P.S.I.

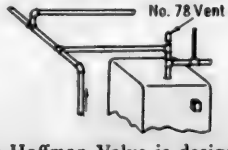
NO. 790 WATER VENT



A typically fine quality Hoffman Vent Valve especially designed for venting convectors, baseboard and wall radiation. Assures positive venting and continuous removal of air from system. If dirt should lodge between pin and seat, cap can be tightened down to prevent spitting until valve is cleaned. Safety drain connection at top for discharging moisture entrained in the vented air. Fitting and Ferrule for ⅜" O.D. tubing. Size conn.: ⅛". Max. operating press.: 30 P.S.I.

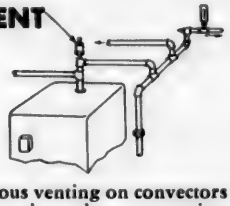
NO. 78 WATER VENT

WILL WITHSTAND HYDROSTATIC PRESSURES OF 450 P. S. I.



This Hoffman Valve is designed for use on high pressure hot or cold water mains and process applications. Automatically vents air from all water systems. Cast Brass Body. Safety drain connection for discharging moisture entrained in the vented air has fitting and ferrule for ¼" O.D. tubing. Size conn.: ¾" Male, ½" Female, Max. operating press.: 150 P.S.I.

NO. 791 WATER VENT



For continuous venting on convectors and small mains where operating pressure does not exceed 50 P.S.I. all brass body and fittings. This Hoffman Valve can be easily taken apart for cleaning or removal of dirt or compounds. Safety drain connection at top (has Fitting and Ferrule for ⅜" O.D. tubing for discharging moisture entrailed in the vented air.) Baseconn.: ¼". Max. operating press.: 50 P.S.I.

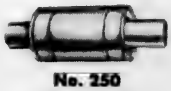
OTHER HOFFMAN WATER SYSTEM SPECIALTIES

No. 150 High Head Circulators

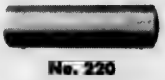
No. 193 Circulator Valves

No. 201 Vent Tees

No. 1500 Air Separators "Swirivent"



No. 250 Expansion Joints



No. 220 Expansion Tanks

SOLD ONLY THROUGH LEADING WHOLESALERS OF HEATING AND PLUMBING EQUIPMENT

Write for Hot Water Catalog No. HW-855

HOFFMAN SPECIALTY MFG. CORP. 1700 W. 10th Street, Indianapolis 7, Indiana

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LIQUID DEPTH GAUGES

ACCURATE and EASY TO INSTALL

Available in 4 Models, Petrometer Series 1400 Tank Gauges operate on the sound principle of hydrostatic pressure. No moving parts, no expensive electrical or electronic equipment. Large vertical scale gives accurate, easy-to-see reading. And construction features make installation easy.

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All Petrometer Gauges are guaranteed for one year

Measure Specific Gravity Accurately!

...and from a remote point

The Petrometer remote reading Specific Gravity Indicator is accurate to .001 Sp. G. unit, with interpolation to .0005 unit! It's easy to install... and operates on the simple, sound principle of a differential bubbler.

An ideal instrument for plant or laboratory for measuring specific gravity of any liquid... paints, fuel, resins, pharmaceuticals, chemical solutions.

All functional parts are conveniently mounted on rear of panel, accessible by swinging open the cabinet door.

Send for ***Bulletin 7004***

Petrometer CORPORATION

43-22 TENTH STREET, LONG ISLAND CITY 1, N.Y.

(*Concluded from page* 146)

ACRI MEETING—Annual meeting of the Air-Conditioning and Refrigeration Institute, at The Homestead, Hot Springs, Va. Executive secretary of the Institute, 1346 Connecticut Ave., N. W., Washington, D. C. ..... **MAY 6-8, 1957.**

MECHANICAL CONTRACTORS MEETING—Annual meeting of The Mechanical Contractors Association of America (formerly Heating, Piping and Air Conditioning Contractors National Association) at the Hotel Fontainebleau, Miami Beach, Fla. L. B. Gruman, Jr., secretary of the Association, 30 Rockefeller Plaza, New York 20, N. Y. ..... **MAY 7-10, 1957.**

PROFESSIONAL ENGINEERS—Annual convention and exposition New York State Society of Professional Engineers, Statler Hotel, New York, N. Y. Harold Becker, NYSSPE, 1941 Grand Central Terminal Bldg., New York, N. Y. ..... **MAY 16-18, 1957.**

ASRE CONVENTION—44th annual meeting of the American Society of Refrigerating Engineers, at Hotel Fountainebleau, Miami, Fla. Secretary of the Society, 234 Fifth Ave., New York 1, N. Y. ..... **JUNE 2-5, 1957.**

NDHA MEETING—48th annual meeting of the National District Heating Association, at The Homestead, Hot Springs, Va. J. F. Collins, Jr., secretary-treasurer of the Association, 827 N. Euclid Ave., Pittsburgh, Pa. ..... **JUNE 3-6, 1957.**

WARM AIR HEATING—National Warm Air Heating and Air Conditioning Association summer convention, Hotel Fairmount, San 1, N. Y. ..... **JUNE 3-6, 1957.**

TECHNICAL CAREER CONFERENCE—A Technical Career Conference, sponsored by the Technical Career Council, at the Sherman Hotel, Chicago, Ill. M. W. Hinson, director of the Council, 19 S. LaSalle St., Chicago 3, Ill. ..... **JUNE 8-12, 1957.**

ASHAE SUMMER MEETING — Semi-annual meeting, American Society of Heating and Air-Conditioning Engineers, Manoir Richelieu, Murray Bay, Quebec, Canada. A. V. Hutchinson, executive secretary of the Society, 62 Worth St., New York 13, N. Y. ..... **JUNE 24-26, 1957.**

AGA MEETING—Annual convention, American Gas Association, Kiel Auditorium, St. Louis, Mo. AGA, 420 Lexington Ave., New York, N. Y. ..... **OCTOBER 7-9, 1957.**

ASRE MEETING—Semi-annual meeting of the American Society of Refrigerating Engineers, at the Hotel Shoreland, Chicago, Ill. Secretary of the Society, 234 Fifth Ave., New York 1, N. Y. ..... **NOVEMBER 14-16, 1957.**

WHOLESALERS—Annual meeting, Air Conditioning and Refrigeration Wholesalers, Sheraton Hotel, Chicago, Ill. ..... **NOVEMBER 16-18, 1957.**

AIR-CONDITIONING AND REFRIGERATION EXPOSITION — 10th exposition of the Air-Conditioning and Refrigeration industry, sponsored by the Air-Conditioning and Refrigeration Institute, at Chicago's International Amphitheatre, Chicago, Ill. Secretary of the Institute, 1346 Connecticut Ave., N. W., Washington 6, D. C. ..... **NOVEMBER 18-21, 1957.**

WARM AIR HEATING—Annual convention, National Warm Air Heating and Air Conditioning Association, Hotel Morrison, Chicago, Ill. George Boedener, Secretary, NWAHACA, 640 Engineers Bldg., Cleveland, Ohio ..... **NOVEMBER 18-22, 1957.**

ASHAE WINTER MEETING — 64th annual meeting, American Society of Heating and Air-Conditioning Engineers, Pittsburgh, Pa. A. V. Hutchinson, secretary ASHAE, 62 Worth St., New York, N. Y. ..... **JANUARY 27-29, 1958.**

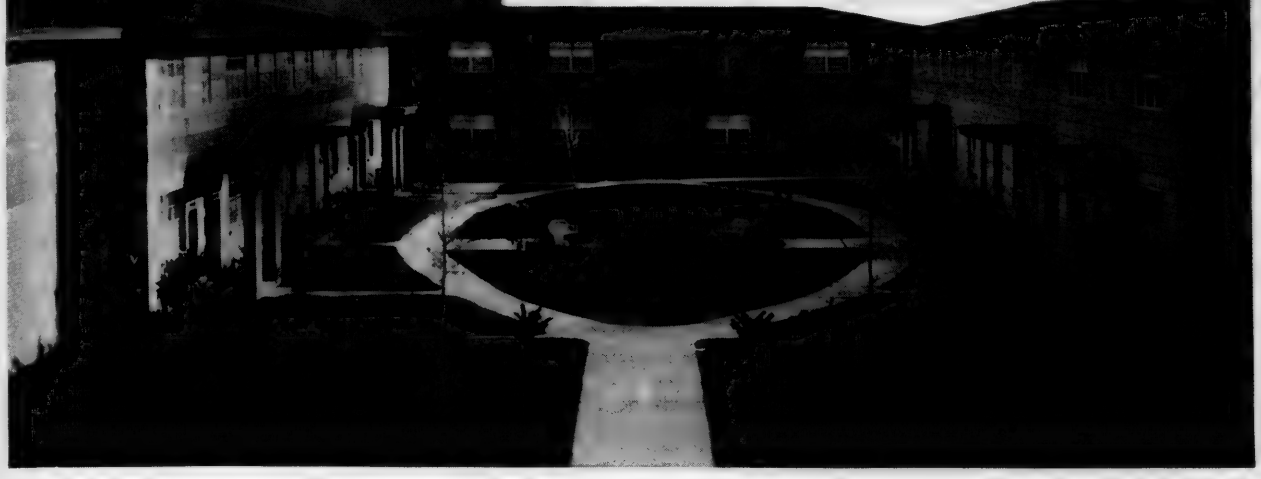
JOINT ASHAE-ASRE MEETING—Joint summer meeting, American Society Heating and Air-Conditioning Engineers and American Society Refrigerating Engineers, Hotel Leamington, Minneapolis, Minn. ..... **JUNE 23-25, 1958.**

EXPOSITION AND ASHAE CONVENTION—65th annual meeting, American Society Heating and Air-Conditioning Engineers (Jan. 26-29, 1958) and 14th International Heating and Air Conditioning Exposition, Philadelphia, Pa. ..... **JANUARY 26-30, 1959.**

PARKFRONT APARTMENTS

La Fonda

AIRTEMP keeps the 354 units of Houston's La Fonda development cool, even in Texas' hottest weather. Equipment: three packaged chilled-water systems which total 390 tons capacity. *Consulting Engineer:* O. E. Winter. *Builder:* Winter-Mallette Building Company. *Architect:* Joseph D. Reynolds.



2-Bedroom Apartments

EASILY RENTED for $135.00

when air-conditioned with Chrysler's Airtemp at La Fonda development

Chrysler's advanced engineering

makes air conditioning practical

for every building project!

Dial "Springtime" Any Time

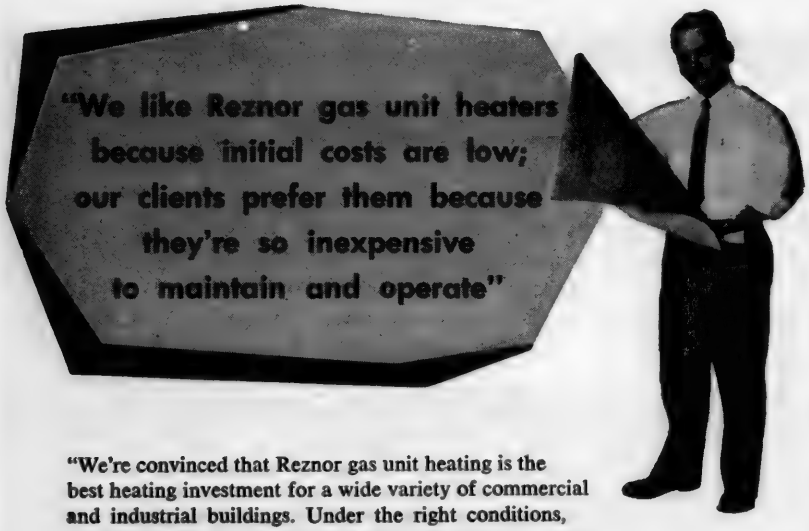
EASY TO INSTALL—*world's largest selection of models!*

Airtemp CONSTRUCTION

DIVISION OF CHRYSLER CORPORATION

PHONE your nearby Airtemp outlet for details on the advantages of AIRTEMP Air Conditioning for *your* next project. Or write direct to Airtemp Construction Division, Chrysler Corporation, Dayton 1, Ohio.

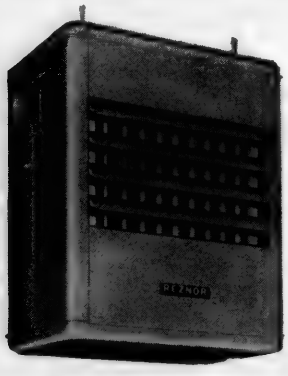
AIR CONDITIONING AND HEATING FOR A HOME, A BUSINESS, AN AUTOMOBILE


"We like Reznor gas unit heaters
because initial costs are low;
our clients prefer them because
they're so inexpensive
to maintain and operate"

"We're convinced that Reznor gas unit heating is the best heating investment for a wide variety of commercial and industrial buildings. Under the right conditions, no other system can approach it for performance. Under any conditions no other system can approach it for economy.

"We found that the cost of the necessary Reznor gas unit heaters compares very favorably with the cost of any other type of heating equipment of the same total capacity. And with Reznor, the equipment cost is total cost. There are no registers or radiators, no expensive piping or duct work to buy. That means real savings on installation cost, too. To install a Reznor gas unit heater you just suspend it, make simple gas, electrical and vent connections and move on to the next one. That's real economy . . . it helps stretch budgets.

"Our clients like Reznor heaters for other reasons, too. Reznor heaters not only save money in the beginning, they keep on saving year after year. Reznor heat is instant heat . . . there's no need for costly stand-by firing. With on-the-spot Reznor heat, there's no heat lost in transmission. And with each Reznor heater operating independently, there's no need to heat areas which aren't in use. All this adds up to substantial savings on fuel. Reznor heaters require no operating labor. And maintenance costs are practically zero. All Reznor heaters require is a simple cleaning once a year. It's no wonder that our clients who have tried it once want Reznor heating in their next building."



Remember, there is no equivalent for Reznor gas unit heaters. Be sure you have complete information on these fine heaters at your fingertips. Write today for your free catalog or call your nearby Reznor distributor. You'll find him listed under "Heaters-Unit" in the yellow pages of your telephone directory.

REZNOR
THE WORLD'S LARGEST-SELLING GAS UNIT HEATERS
REZNOR MANUFACTURING COMPANY
64 Union Street, Mercer, Pa.

NEW CATALOGS

Use the prepaid postcard on page 105 for securing your copies of catalogs described in this department.

DEEP WELL TURBINE PUMPS—A Bulletin 4701-D, published by The Deming Company, Salem, Ohio, describes an expanded line of Minuturb turbine pumps that deliver more than 100 gpm from deep wells. It presents construction features and performance data. Pumps and water systems are designed for service in large country homes, schools, motels, industrial plants, dairies, and other locations where more than the normal water supply is required.

Circle **Item 52** on Inquiry Card

PNEUMATIC PRESSURE TRANSMITTER—Specification S705-1, published by Industrial Div., Minneapolis-Honeywell Regulator Co., Philadelphia, Pa., describes the Brown Non-Indicating Pneumatic Pressure Transmitter, for vacuum or pressure measurement. Using a spiral or spring and bellows primary element, it will measure and transmit pressures from 0-90 inches of water to 0-4000 psi.

Circle **Item 53** on Inquiry Card

STEEL AND ITS ALLOYS—Engineers associated with the design and operation of high temperature equipment in processing plants will be interested in reprint No. TR-544 now available from the Tubular Products Division of The Babcock & Wilcox Co., Beaver Falls, Pa. The paper, High-Temperature Problems in Process Plants, discusses the use of steel and its various alloys, and the mechanical and physical reactions of the materials under various temperature and corrosive environments.

Circle **Item 54** on Inquiry Card

VENTILATING LINE—A 4-page, 3-color catalog, Form KAH-57, showing its line of 1957 Kitchen-Aire ventilators and range hoods has been released by Stewart Industries, Inc., Indianapolis, Ind. Brochure shows 2 new ventilators as well as 2 hood styles. It also introduces a low-cost fan and fan-in-hood combination.

Circle **Item 55** on Inquiry Card

MOTOR SELECTION MANUAL—Selection of the right electric motor is made conveniently with its application guide published by Century Electric Co., St. Louis, Mo. Tables integrate machinery to be driven, character of the load, speed of operation, starting and running torques, surrounding atmosphere, frame type, and motor speed.

Circle **Item 56** on Inquiry Card

(*Continued on page* 152)

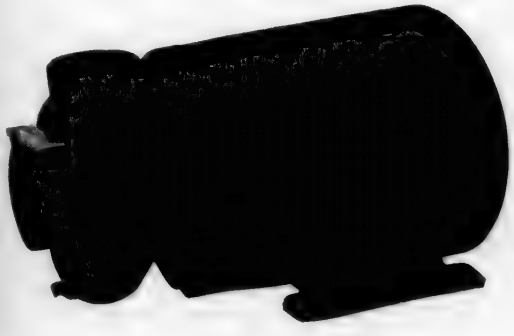
THE MOTOR PUMP

IS ALWAYS A GOOD

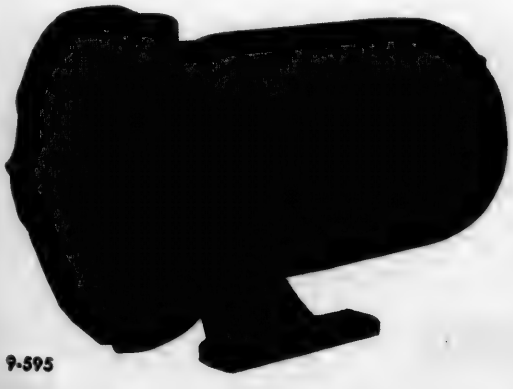
sales point

Customers buying air conditioning systems are vitally interested in the various components that make up the system. They want brand names they know and recognize . . .

When you offer Ingersoll-Rand Motorpumps as an integral part of the systems you sell, your customers are getting dependable, trouble-free service from compact pumps designed specifically for air conditioning service. *You* get easy installation, fewer service calls . . . and more satisfied customers.



Motorpumps are available from 1/4 to 75 horsepower. Write for our latest literature on Motorpumps for air conditioning service.



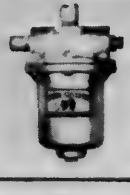
9-595

Ingersoll-Rand

11 Broadway, New York 4, N.Y.

● Don't be misled into thinking that one type of steam trap meets all requirements. Each type of trap has a purpose—operates efficiently only under certain conditions. The correct selection of the right type of trap for each application pays for itself by draining *all* condensate and venting *all* air in the *shortest* possible time.

ANDERSON STEAM TRAP SELECTION GUIDE



Super-Silvertop INVERTED BUCKET

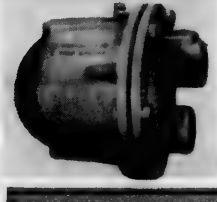
For normal inside uses. More efficient since condensate, rather than temperature differentials, actuates the trap. Patented guided bucket arrangement eliminates bucket damage and assures positive seating.

Heat-Kwik COMBINATION BUCKET AND THERMOSTATIC

For extremely fast heating up. Unique combination design vents air eight times faster from cold units. Permits production units like cookers, dryers, autoclaves, kettles to reach maximum capacity in 2½ minutes.

Quik-Flex THERMOSTATIC

For all outdoor applications. Wherever a freeze-proof trap is required such as tracer lines, meter boxes, etc. Particularly recommended for refineries, chemical, petrochemical and other outdoor type plants.



Anderson FLOAT Traps

For continuous trapping. Such as ahead of condensate meters (bucket traps operate intermittently). Also for draining moisture and entrainment from *air* and *gas* pipelines, purifiers, separators and other equipment.

THE V. D. ANDERSON COMPANY

2480 West 78th Street • Cleveland 2, Ohio, U.S.A.

YES I want to use the right steam trap. Please send information on the following types:

- ☐ Inverted bucket
- ☐ Combination
- ☐ Thermostatic
- ☐ Float

*Name*_____

*Company*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

QUALITY STEAM TRAPS SINCE 1868

NEW CATALOGS

(*Continued from page* 150)

Use the prepaid postcard on page 105 for securing your copies of catalogs described in this department.

AIR DISTRIBUTION GRILLES—Catalog F-1415-12 describing its line of Uni-Flo air distribution grilles is available from Barber-Colman Co., Rockford, Ill. It contains data on accessories and photographs of smoke tests illustrating the performance of the grilles and accessories.

Circle **Item 57** on Inquiry Card

VERTICAL TURBINE PUMPS—Its general catalog, covering a wide line of vertical turbine pumps, is available from Wintroath Pumps, a division of Worthington Corp., Alhambra, Calif. Included is 30 pages covering company's electric drive, right angle drive, and pulley drive pump heads, detailed illustrations of discharge column construction, pump bowls, impellers, details of lubrication, its surge control valve, its booster and pressure pumps. Typical installations are illustrated. Finally, three pages of useful engineering data are presented in handy tabular form.

Circle **Item 58** on Inquiry Card

AIR CONDITIONERS, FURNACES—A series of colorful new product folders has been prepared by Airtemp Division, Chrysler Corp., Dayton, Ohio. The folders, six in number, illustrate and contain specific information on the company's 1957 commercial and residential product lines.

LL-149 illustrates and contains information on 2 and 3-hp low-cost packaged home air conditioners.

Circle **Item 59** on Inquiry Card

LL-150 illustrates and contains feature information on line of waterless, home air conditioning equipment for use with existing forced warm air heating systems.

Circle **Item 60** on Inquiry Card

LL-153 illustrates and contains information on eighteen models of gas-fired furnaces.

Circle **Item 61** on Inquiry Card

LL-154 illustrates and contains data on seventeen models of oil-fired furnaces.

Circle **Item 62** on Inquiry Card

LL-241 describes line of commercial, packaged air conditioners in 3 to 30 tons capacity.

Circle **Item 63** on Inquiry Card

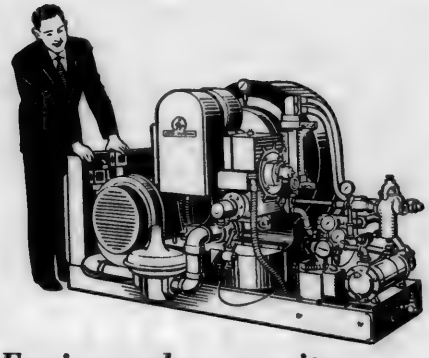
LL-243 describes and illustrates commercial applications of the company's waterless air conditioning units.

Circle **Item 64** on Inquiry Card

(*Continued on page* 154)

Iron Fireman packaged oil firing units applied to firebox boilers. These units are suitable for nearly all types of steam or hot water boilers. The heating plant shown above is in the office building of the Celanese Corporation of America, Charlotte, N. C.

A complete firing system by Iron Fireman



Engineered as a unit . . .
installed as a unit

For oil, gas or oil-gas combination

Here is a *factory engineered* firing system. Everything needed for balanced firing is mounted on a rigid steel base, ready to bolt to the boiler front. Nothing is left to the uncertainties of local assembly. For example, the critical refractory firing throat is pre-cast and installed at the factory, rather than being molded on the job. It is critical because proper design and accurate placement of the refractory tile increases combustion efficiency. It is scientifically designed to introduce secondary air around the burner head, avoiding the elaborate firebox brickwork in the typical conversion job.

Accurate control of all firing functions Every factor that affects firing efficiency is engineered into the unit at the factory. The unit includes: (1) Single or dual-fuel burner, with complete fuel handling systems. (2) Forced draft air supply. (3) Enclosed control panel, with instruments mounted, factory wired and tested, and with signal lights and dials that afford a complete reading at a glance.

In the oil-gas units, fuels can be switched automatically, or with the simple flick of a switch. Fires any fuel gas or any commercial grade of fuel oil available, including No. 6, without changing burner adjustment.

Local service. Hundreds of dependable Iron Fireman dealers are located in all parts of the United States and Canada. Their factory trained personnel are ready to furnish quick service to your burner, should the need arise. In addition, factory engineers are available in most areas to help you and your consulting engineer in planning boiler room modernization or construction.

For further information, mail coupon.

With matched Scotch type boiler

America's top boiler manufacturers join with Iron Fireman to produce boiler-burner units in which the boiler and firing system are engineered as a single integrated unit. Hundreds of these installations are in use in all parts of the world, with outstanding performance records. The boiler room, shown above, equipped with Iron Fireman-Kewanee units, is in one of the Detroit plants of the Briggs Manufacturing Company.

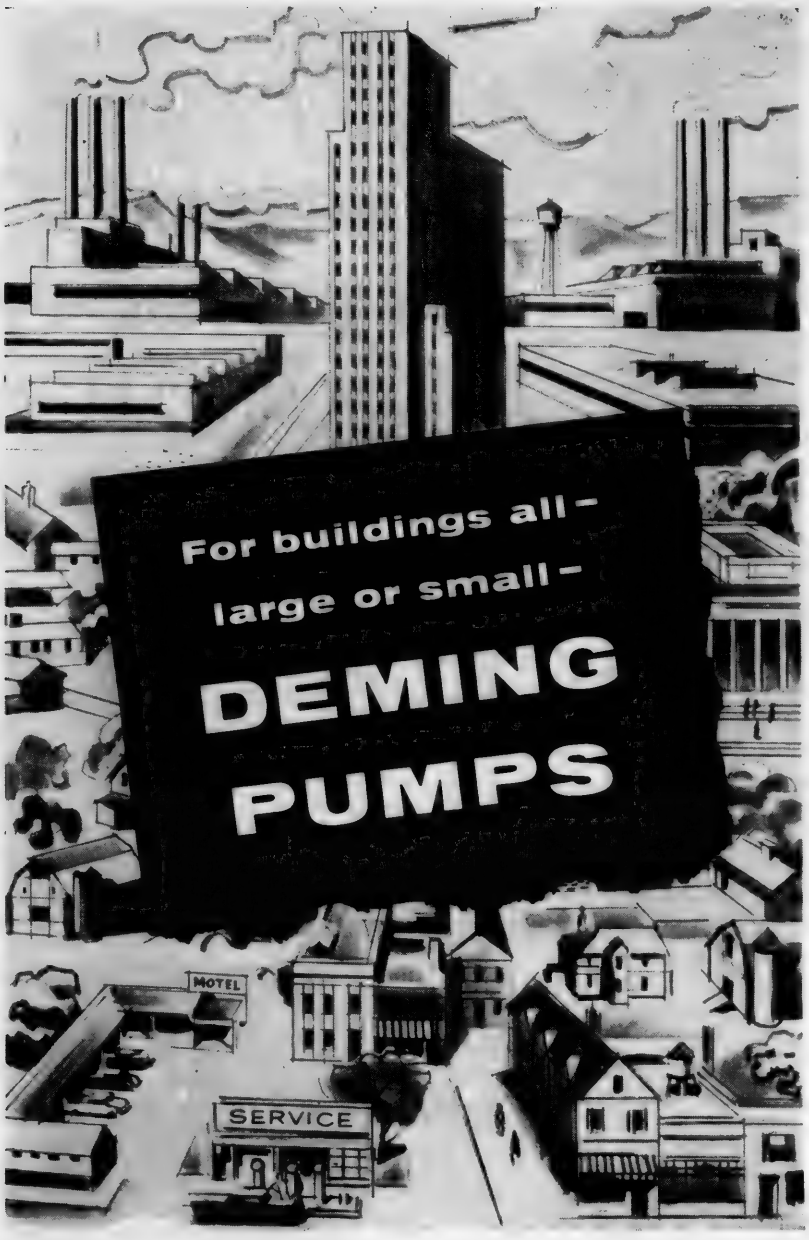
Iron Fireman.

AUTOMATIC FIRING EQUIPMENT FOR OIL, GAS, COAL

IRON FIREMAN MANUFACTURING CO.
3350 W. 106th Street, Cleveland 11, Ohio
(In Canada, 80 Ward Street, Toronto, Ont.)

Please send information on Iron Fireman forced draft firing for oil, gas, or oil-gas combination.

Name_____
Firm_____
Address_____
City_____ State_____



Look to the big Deming line for the right answers to most pumping problems.

Horizontal and vertical centrifugal pumps, air conditioning pumps, sump pumps, sewage pumps, high pressure pumps, boiler feed pumps, condensation return units, vertical turbine pumps, jet pumps, submersible pumps, power driven reciprocating or plunger pumps, and others are included in the big Deming line.

Proper pump selection is important! Free bulletins on all Deming Pumps are available. Name your needs. Write to:

THE DEMING COMPANY
558 BROADWAY • SALEM, OHIO

NEW CATALOGS

(*Continued from page* 152)

Use the prepaid postcard on page 105 for securing your copies of catalogs described in this department.

HOLLOW CONCRETE FLOOR PANEL—Two bulletins are available from Airfloor Company of California, Inc., Norwalk, Calif. They describe the company's system of hollow concrete floor panel for warm air heating and ventilating or complete air conditioning. Application methods are illustrated.

Circle **Item 65** on Inquiry Card

HOT WATER HEATING SYSTEMS—A new booklet, How to Design Hot Water Heating Systems, has been released by Crane Co., Chicago, Ill. The 45-page booklet has a section on how to calculate heat loss, and sections on selection of heating system, boiler, and heating specialties.

Circle **Item 66** on Inquiry Card

BUYING USED MACHINES—A booklet on how to buy a used machine tool, a primer for the used machinery buyer, is published by S & S Machinery Co., Brooklyn, N. Y. Written in question and answer form, it covers most aspects of used machinery purchase. Such questions as what test equipment to bring with you; the detailed things to look for when inspecting a used tool; the pros and cons of buying as-is, reconditioned for rebuilt equipment; and the guarantees that come with each type of purchase, are covered.

Circle **Item 67** on Inquiry Card

VAPOR BARRIER COATING—Ellis and Watts Inc., Cincinnati, Ohio, has available a bulletin which describes in detail its vapor barrier coating, designed to control the transmission rate of water vapor through any type of building material, an important factor in increasing the efficiency of dehumidified storage areas. According to the manufacturer, coating is guaranteed to retard the rate of vapor transmission to less than 0.3 grain per sq ft per hr at one in. mercury vapor differential. Bulletin describes how coating can be applied to the interior or exterior surface of any type of building material.

Circle **Item 68** on Inquiry Card

DUCT INSULATION—A 6-page folder published by Johns-Manville, New York, N. Y., deals specifically with its insulation for air conditioning ducts. It gives pertinent physical and thermal property data, a table of standard sizes, thicknesses and available facings as well as information concerning special facing characteristics. One page is devoted to schematic drawings which illustrate basic application principles. Also, there is a simplified application specification that can be copied directly by the architect or engineer into his own job specification.

Circle **Item 69** on Inquiry Card

(*Continued on page* 157)

RAPID...

Complete Defrosting With Glycol

in

Levitz Frozen Foods, Inc., Lebanon, Penna.

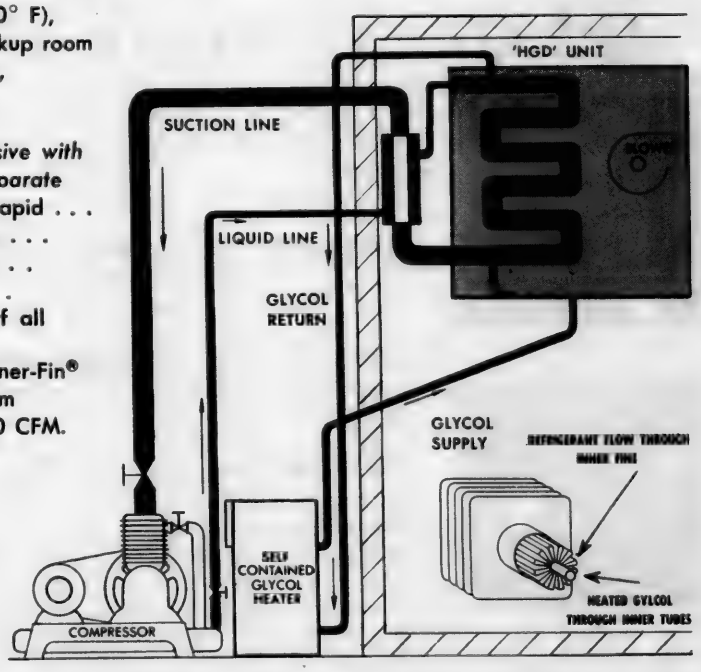
Refrigeration Contractor: Herre Bros., Harrisburg, Penna.
Consulting Engineers: V. C. Patterson & Associates, York, Penna.

Dunham-Bush Heavy Duty Product Coolers

Dunham-Bush 'GD' Glycol Defrost product coolers in the sharp freeze room (maintained at minus 30° F), meat storage room (minus 10° F) and breakup room (0° F) at Levitz Frozen Foods, Inc., Lebanon, Pennsylvania, require defrosting for only *30 minutes once a day.*

Inner-Fin® construction of these units, *exclusive with Dunham-Bush,* makes possible an *entirely separate* defrost circuit (see diagram). Defrosting is rapid . . . room temperature rise is held to a minimum . . . no dilution of defrost medium is possible . . . system has "separate-circuit" reliability . . . power economies are marked. Defrosting of all units is automatically controlled.

'GD' units, featuring all copper patented Inner-Fin® construction, are available in capacities from 22,000 to 136,000 BTU/hr., 4,800 to 18,300 CFM.



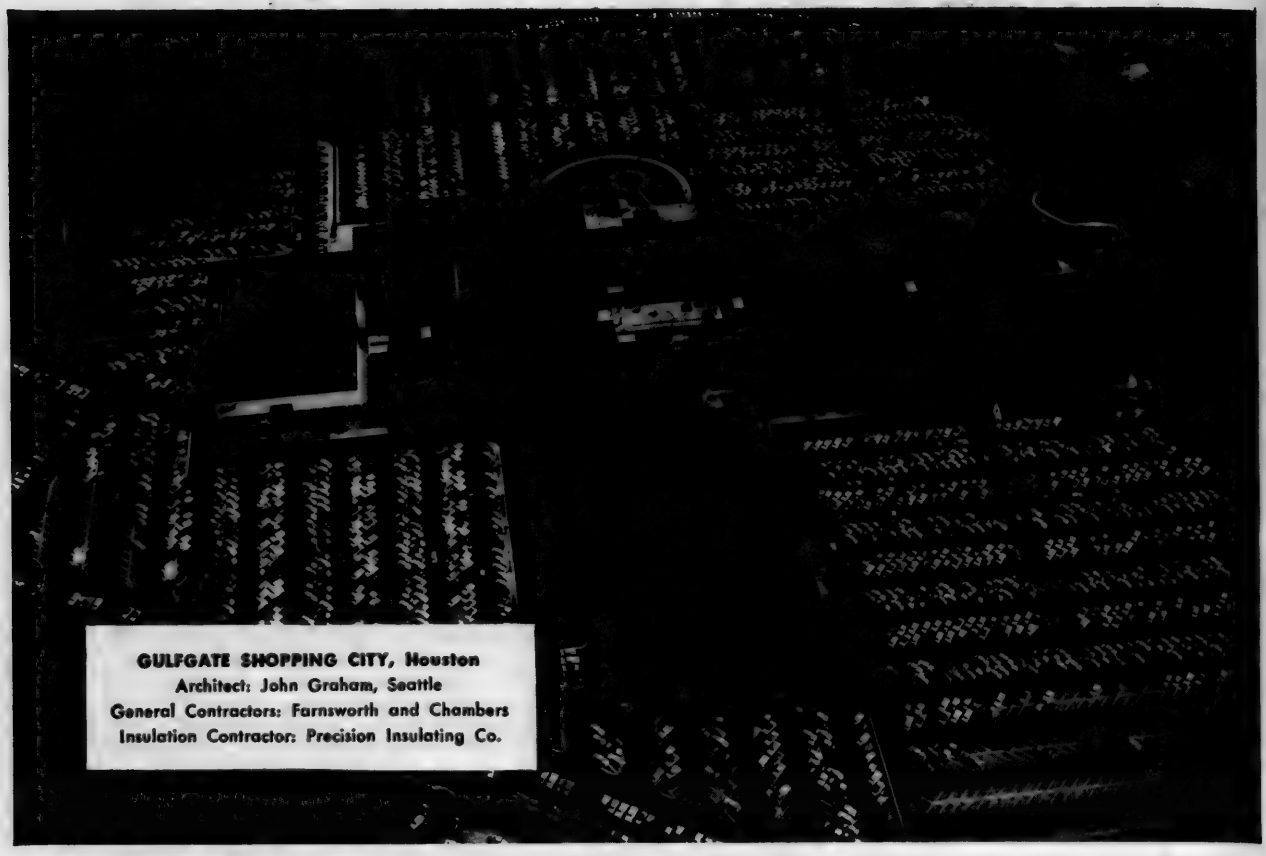
Request free catalog containing complete information on these and other units in the extensive Dunham-Bush line of *quality* low temperature equipment.

DUNHAM-BUSH

Dunham-Bush, Inc.

WEST HARTFORD 10 • CONNECTICUT • U. S. A.

AIR CONDITIONING, REFRIGERATION, HEATING PRODUCTS AND ACCESSORIES



GULFGATE SHOPPING CITY, Houston
Architect: John Graham, Seattle
General Contractors: Farnsworth and Chambers
Insulation Contractor: Precision Insulating Co.

Whopping shopping center goes for GUSTIN gb BACON GLASS FIBER INSULATIONS...

. . . because G-B insulations are a step ahead in thermal and acoustical efficiency, in ease of application, and in lasting performance. At the world's largest shopping center — and in commercial, institutional and industrial construction everywhere — the first call is for these superior G-B products:

ULTRALITE DUCT LINER, the long glass fiber insulation specifically designed to silence objectionable noises in air conditioning systems — and an excellent thermal insulation in the bargain.

ULTRALITE DUCT INSULATION, the long glass fiber insulation that is superior in thermal efficiency . . . tougher and more resilient . . . easier and cheaper to apply.

G-B SNAP*ON, the popular one-piece pipe insulation molded of fine glass fibers. Snap*On is not only superior in thermal efficiency to *any* general-purpose pipe insulation on the market, but also far easier and cheaper to apply because 3-foot sections snap on the pipe in less time than it takes to say "Snap*On"!

FOR INFORMATION AND PROMPT DELIVERY CALL YOUR
LOCAL G-B INSULATION DISTRIBUTOR LISTED IN ADJOINING COLUMN

GUSTIN-BACON *Manufacturing Company* GUSTIN gb BACON

Thermal and acoustical insulations • Molded glass fiber pipe insulation • Pipe coupligns and fittings

222 W. 10th ST., KANSAS CITY, MO.

G-B SNAP-ON AND ULTRALITE DISTRIBUTORS

(See ad on facing page)

ALBUQUERQUE, Mt. States Insulation Co.
AMARILLO, Ball Distributing & Engr. Co.
APPLETON, J. D. Wilson Co.
ATLANTA, Ga., Southern States Iron Roofing Co.
BILLINGS, Mont., Big Horn Supply, Inc.
BIRMINGHAM, Ala., Shook & Fletcher Supply
Southern States Iron Roofing Co.
BROOKLINE, Mass., Homans-Kohler, Inc.
BUFFALO, Frontier Insulation & Supply Co.
CHARLESTON, W. Va., Baldwin Asbestos Products Co.
CHARLESTON HEIGHTS, S. C., Stafford Insulation Co.
CHARLOTTE, N. C., Guy M. Beaty & Co.
CHATTANOOGA, Guy M. Beaty & Co.
CHICAGO, E. C. Carlson Co.
CINCINNATI, R. E. Kramig & Co.
CLEVELAND, The Miles Materials Co.
COLUMBIA, S. C., Southern States Iron Roofing Co.
COLUMBUS, Santeler Brothers
DALLAS, Insulation Supply Co., Inc.
Payne-Ladewig, Inc.
DAVENPORT, Republic Electric Co.
DENVER, Gene Wright Lumber Co.
DETROIT, Coon-DeVisser Co.
EL PASO, Insulation & Specialties Co.
FARGO, N. D., Smith, Inc.
FT. SMITH, Ark., Gunn Distributing Co.
FT. WAYNE, Ind., M. H. Hilt, Inc.
FT. WORTH, The Bracken Co.
GREENSBORO, N. C., Starr Davis Co., Inc.
GULFPORT, Miss., Paine Supply Co.
HOUSTON, Precision Insulation Co
INDIANAPOLIS, Central Supply Co.
IRON MOUNTAIN, Mich., Champion, Inc.
JACKSON, Miss., Paine Refrigeration Supply Co.
JACKSONVILLE, Fla., Ferber Sheet Metal Works, Inc.
JOPLIN, Mo., Joplin Cement Co.
KANSAS CITY, Kelley Asbestos Co.
LITTLE ROCK, Gunn Distributing Co.
LOS ANGELES, Western Fibrous Glass Products
Thorpe Insulation Co.
LOUISVILLE, General Insulation & Roofing Co.
MADISON, Wis., J. D. Wilson Co.
MEMPHIS, John A. Denie's Sons Co.
MIAMI, Southern States Iron Roofing Co.
MILWAUKEE, J. D. Wilson Co.
MINNEAPOLIS, Asbestos Products, Inc.
MOBILE, Ala., Shook & Fletcher
NASHVILLE, Southern States Iron Roofing Co.
NEWARK, N. J., Eastern Steam Specialty Co.
NEW HAVEN, Conn., Insulation Supply Co.
NEW ORLEANS, Eagle Asbestos & Packing
NEW YORK, Eastern Steam Specialty Co.
OKLAHOMA CITY, Ball Distributing & Engineering Co.
OMAHA, Cardinal Supply & Mfg. Co.
PHILADELPHIA, John F. Scanlan, Inc.
PITTSBURGH, Dravo Corp.
PHOENIX, Ariz., Kircher Asbestos & Rubber Co.
RALEIGH, N. C., Southern States Iron Roofing Co.
RICHMOND, Va., Southern States Iron Roofing Co.
ROCKFORD, Ill., Mott Brothers Co.
SALT LAKE CITY, Bullough Asbestos Supply Co.
SAN ANTONIO, The Bracken Co.
SAN DIEGO, Western Fibrous Glass Products
SAN FRANCISCO, Western Fibrous Glass Products
SAVANNAH, Ga., Southern States Iron Roofing Co.
SEATTLE, Western Fibrous Glass Products
ST. LOUIS, A. G. Brauer Supply Co.
ST. PAUL, Asbestos Products, Inc.
SYRACUSE, N. Y., Industrial Supply Co.
TAMPA, Fla., Eagle Roofing & Art Metal Works, Inc.
TALLAHASSEE, Fla., Capital Refrigeration & Supply
TULSA, Okla., Ball Distributing & Engr. Co.
TUPELO, Miss., Paine Supply Co.
WASHINGTON, Walter E. Campbell Co., Inc.
WICHITA, Jamar-Olmen Construction Co.
General Metals, Inc.
VANCOUVER, B. C., Fleck Brothers Limited

GUSTIN gb BACON

NEW CATALOGS

(*Continued from page* 154)

Use the prepaid postcard on page 105 for securing your copies of catalogs described in this department.

GAS FURNACE LINE—A full color brochure entitled Inside Facts on American-Standard Gas-Fired Winter Air Conditioners has been released by the American-Standard Air Conditioning Div., New York, N. Y. Their complete line of basement, utility, counterflow and horizontal models are shown both fully assembled and in cutaway views so that construction and assembly details may be seen at a glance. The back cover of this brochure contains an easy reference chart which gives complete dimensional and rating data for the full line.

Circle **Item 70** on Inquiry Card

PERIMETER WARM AIR HEATING—An 8-page brochure entitled Comfort Engineering Data is published by Gerwin Industries, Inc., Michigan City, Ind. Pertaining to the manufacturer's system of perimeter warm air heating, it provides tables for use in heat loss calculations, performance data, and installation procedure.

Circle **Item 71** on Inquiry Card

EVAPORATIVE CONDENSERS—A 12-page bulletin describing their line of evaporative condensers for ammonia and Freon refrigerating systems is published by Frick Company, Waynesboro, Pa. Bulletin 234-G provides dimensional drawings of models in the line as well as construction features and ratings.

Circle **Item 72** on Inquiry Card

WATER APPLIANCES—Its 1957 line of Rapidayton water appliances is shown in 40-page catalog No. 571 published by The Tait Mfg. Co., Dayton, Ohio. Included are jet, reciprocating, and submersible pumps and water systems, cellar drainers, and water softeners. Among the new products are single- and two-stage vertical jet pumps; an automatic water softener with brine storage tank; and a line of upright and submersible cellar drainers.

Circle **Item 73** on Inquiry Card

STEAM COILS—Bulletin S-200, available from Halstead & Mitchell, Pittsburgh, Pa., describes in detail the company's new line of standard and non-freeze steam coils, using its Turbu-Flo finned surface for high heat transfer. The catalog describes the construction of the coils, including tubing, casings, headers, refrigerant distribution, return bends, and valves. Tests and dehydration as well as means of specifying special coils are also described.

Circle **Item 74** on Inquiry Card

PANEL WIRING TECHNIQUES—An informative 8-page bulletin released by Stahlin Brothers, Inc., Belding, Mich., outlines new raceway techniques for wiring of electrical and electronic equipment. Bulletin S-301 presents methods for simplifying wiring operations from the drafting room to the assembly floor by use of raceways and pre-cut wires. It points out ways to improve appearance with one-third the work of bundling and lacing wires.

Circle **Item 75** on Inquiry Card

ELECTRONIC AIR CLEANERS—Trion, Inc. of McKees Rocks, Pa. has issued two new catalogs in connection with its Model 6 line of electronic air cleaners. Catalog No. E-81 deals with home installations and Catalog No. E-82 with installations for small commercial establishments.

Circle **Item 76** on Inquiry Card

STEAM SPECIALTY LINE—Their steam specialty line has been re-catalogued in Bulletin DS-260 by The Trane Company, La Crosse, Wis. Among items catalogued are the company's hermetic "lifetime" valve, bucket traps, float-thermostatic traps, and temperature control valves.

Circle **Item 77** on Inquiry Card

HUMIDIFICATION SYSTEMS EQUIPMENT—Bulletin 82, offered by Spray-Systems Co., Bellwood, Ill., illustrates and describes nozzles, nozzle assemblies, float boxes, humidistats, solenoid operated valves, and all other required components for industrial humidifying systems. In addition to humidifying equipment, this bulletin also describes nozzles for such installations as air washers and cooling towers.

Circle **Item 78** on Inquiry Card

UNDERGROUND PIPE INSULATION—A new company paper published by American Gilsonite Co., Salt Lake City, Utah, is 4-page Pipe Insulation News. It will be published quarterly and carry stories and articles dealing with the problem of insulating hot underground pipes.

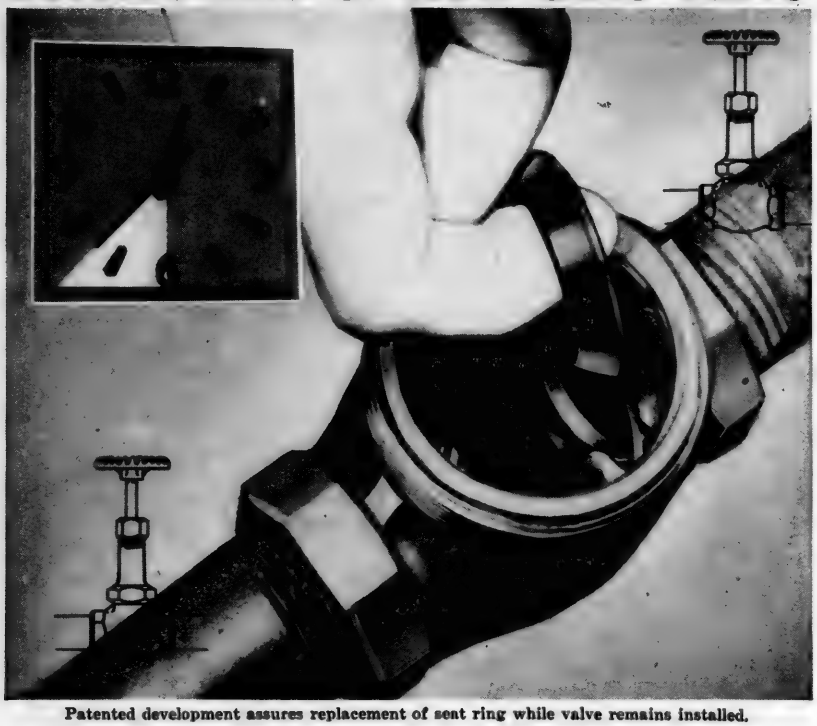
Circle **Item 79** on Inquiry Card

THERMOSTATS—An 8-page engineering data book is published by The Franklin Dales Co., Akron, Ohio, on its line of sensitive detecting elements used in motors, cycling systems, fire alarm, sprinkler, and regulating systems, automatically making and breaking circuits, and for other electrical and electronic instrument applications. Actual size illustrations and specifications on all standard models are given.

Circle **Item 80** on Inquiry Card

(*Continued on page* 158)

Only 7 to 10 Minutes to Renew Service Life of New Gate Valve



Patented development assures replacement of seat ring while valve remains installed.

Without removing the valve body from the line, you replace the nickel-alloy seat rings in Fairbanks new patented Renewable Seat Ring Gate Valves. In 7 to 10 minutes, from the time the line is shut down until it is put back into operation, you have given a new service life, a new life of dependable tight closure to your valve.

Just 7 to 10 minutes of your maintenance man's time — only 7 to 10 minutes of "down-time" on your steam, water or process piping lines — and you have the equivalent of a new valve in the line. Think of the savings: where once at least one hour, under the most ideal conditions, was required to replace a gate valve in the line, the job is now accomplished in from 7 to 10 minutes.

Field tested for over two years, under all conditions from steam to corrosive liquids, the revolutionary new Fairbanks Renewable Seat Ring Bronze Gate Valve has proven completely satisfactory — absolutely dependable.

Made with either rising stem or non-rising stem construction in ½",¾",1", 1¼",1½" and 2" sizes, the Fairbanks Renewable Seat Ring Bronze Gate Valves are recommended for severe service conditions on 200 lb. steam pressure at 550 degrees F., 400 lb. water, oil or gas pressure — non-shock — lines requiring full flow and subject to frequent operation. Nickel alloy seat rings and wedge make the valves particularly tough and corrosion resistant.

YOURS ON REQUEST: Illustrated, descriptive folder gives complete information on Fairbanks Renewable Seat Ring Gate Valve with details and specifications. Yours without charge. Write today.

THE **Fairbanks** COMPANY
393 Lafayette Street, New York 3, N. Y.
Branches:
New York 3 • Boston 10 • Pittsburgh 22 • Rome, Ga.
Valves • Trucks • Casters • Wheels • Dart & "PIC" Unions

1. Union Bonnet removed. Retaining screw loosened with ordinary screwdriver.

2. Finger hooks inside nickel alloy seat ring. Seat ring lifts out of valve body.

3. New seat ring is inserted. Retaining screw tightened. Bonnet replaced.

NEW CATALOGS

(*Continued from page* 157)

Use the prepaid postcard on page 105 for securing your copies of catalogs described in this department.

ASBESTOS-CEMENT SEWER PIPE—A 4-page brochure on its recently introduced asbestos-cement building sewer pipe is published by Keasbey & Mattison Co., Ambler, Pa. Included is information on the quick assembly procedure of the pipe and coupling, method of installing, features of the pipe and the complete line of related fittings and adaptors. Applications exist in both residential and industrial building.

Circle **Item 81** on Inquiry Card

STEEL TUBING AND FITTINGS—Complete dimensional data on its steel tubing and fittings for vacuum systems and conveying lines are presented in Bulletin V-157, published by H-P Products, Inc., Louisville, Ohio. One page describes diverter valves for pneumatic conveyor systems. Typical industrial vacuum system illustrated.

Circle **Item 82** on Inquiry Card

STEAM PRESSURE VALVE—The Type 44 pilot operated pressure reducing and regulating valve is described in the Cash Standard Bulletin No. 981 issued by A. W. Cash Co., Decatur, Ill. Information contained includes photo and cross-sectional diagram of the valve, specifications, pressure and temperature ratings, capacity chart, installation instructions and other data.

Circle **Item 83** on Inquiry Card

DAMPERS AND LOUVERS — Dampers, louvers, and sheet metal specialties for heating, ventilating, and air conditioning systems are described in its 8-page fully illustrated catalog available from Imperial Damper Co., New York, N. Y. The following, offered in all types and sizes, are included: standard and stormproof louvers; extruded aluminum louvers; automatic, hand-operated, and mixing dampers; high-pressure attenuation boxes, elbows, tees, crosses; and helical locked seam conduit.

Circle **Item 84** on Inquiry Card

CENTRIFUGAL REFRIGERATION UNIT—A bulletin, No. C-1100-B95P, containing information about component parts, features and specifications of the company's new hermetic centrifugal refrigeration unit in sizes from 100 to 500 tons capacity is available from Worthington Corporation, Harrison, N. J.

Circle **Item 85** on Inquiry Card

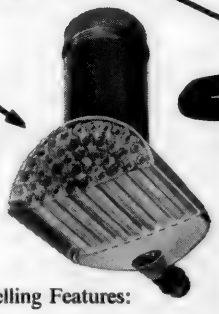
(*Continued on page* 160)

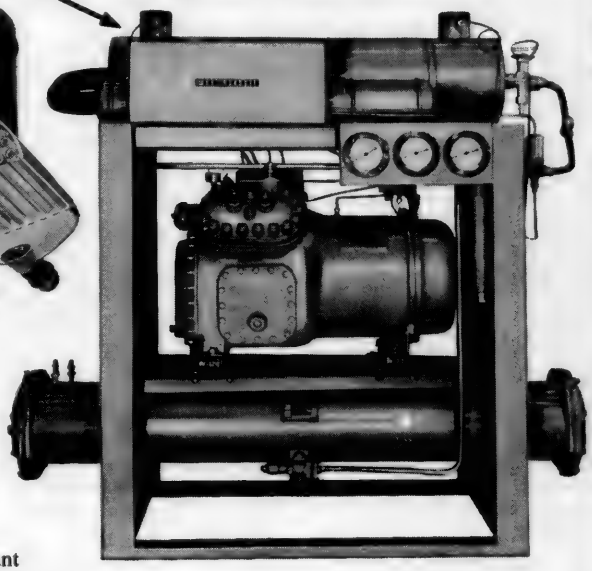
Bid Lower with WESTINGHOUSE *Packaged* WATER CHILLERS

They are *COST SAVERS* for you and your customers!

SPACE SAVERS!

These new packaged Westinghouse water chillers occupy one-third less space than most competitive models. Internal finned construction of the chiller has five times the heat transfer quality of prime tubing.





TROUBLE SAVERS!

Full line of Package Chillers with these Selling Features:

Westinghouse hermetic compressors from 2 to 120 tons.

Westinghouse non-ferrous chiller construction. ASME approved.

Westinghouse condenser. ASME approved.

LABOR SAVERS!

Shipped completely assembled. Packaged for easy installation. Needs no costly electrical wiring or refrigerant piping on the job.

• **COMPLETELY FACTORY ASSEMBLED**—with all piping, control wiring, operating and safety controls, ready for use. Completely tested for capacity and performance. Components selected for your specific application. Built to your specifications. Carries standard Westinghouse warranty.

• **COMPLETE AUTOMATIC CONTROLS!** Liquid line solenoid valves, high-low pressure cutout, oil pressure protector, low water temperature cutout, discharge temperature cutout, water pressure safety switch, time delay relay, return water thermostat, crankcase heater, and control circuit transformer for voltage reduction to 110 volt line circuit.

• **SILENT, SMOOTH, STRONG, COMPACT!** Westinghouse compressor is isolated from frame. Flexible piping in suction and discharge lines to absorb vibration. Strong steel frame may be ordered in two parts to pass through standard 6' door. Unit assembles vertically or horizontally to meet your requirements.

• **NON-FERROUS CHILLED WATER CIRCUITS!** Rust and corrosion resistant copper tubes and shell, brass tube sheets and baffles are cased in ice water insulation. Chillers are completely insulated and covered with a steel protective jacket.

• **OVER 1000 COMBINATIONS—2 TO 120 TON RANGE!** Now, a *single* factory assembled unit to meet *any* cooling need for process or comfort conditions. Two or more units easily combine to do *any* air conditioning or process job. May also be ordered without condensers, for use with separate air or water-cooled assemblies. Built to A.R.I. standards.

CALL THE MAN WITH ALL THE FACTS! You'll find your nearest Westinghouse Air Conditioning Office in the Yellow Pages, or write: WESTINGHOUSE ELECTRIC CORPORATION, AIR CONDITIONING DIVISION, STAUNTON, VIRGINIA.

YOU CAN BE SURE...IF IT'S Westinghouse

J-80532AB

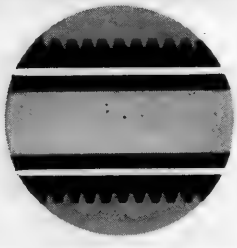
NEW

The first safety barrier
FUEL OIL HEATER
that really delivers
hot oil!

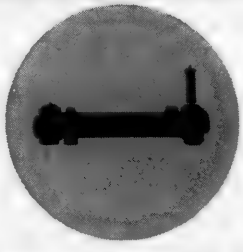
Paracoil
THERMO-FILM*

100% true counter-flow—Straight tube construction delivers full rated capacity at high oil exit temperatures.

Safety-barrier—Heat transfer liquid between tubes eliminates all need for electric warning systems.



Extended tube surface—Greatly increases heat transfer capacity.



No electric wiring—Smaller, lighter, more compact than conventional type heaters.

LOWER FIRST COST – LOWER INSTALLED COST!
More capacity per dollar. The combination of straight tube design, extended tube surface, and special built-in features, gives you greater GPH in the Paracoil Thermo-film Heater in a given temperature range than any other comparable fuel oil heater. And its small size, lightweight and simplicity reduce installation costs too. Only five sizes required to cover all normal capacities.

Write today for Bulletin 60

Approved by Board of Standards and Appeals, City of New York. Cal. No. 321-55SA.

Davis Makes it! BETTER

DAVIS ENGINEERING CORPORATION
30 Rockefeller Plaza, New York 20, New York
1064 East Grand Street • Elizabeth 4, New Jersey

*Trademark/Patent Pending

NEW CATALOGS

(*Continued from page* 158)

Use the prepaid postcard on page 105 for securing your copies of catalogs described in this department.

UNDERGROUND CONDUIT—All the essentials pertaining to underground pipe conduit are contained in Bulletin 9156, according to its publisher, Porter-Hayden Companies, Newark, N. J., manufacturers of Thermo-O-Tile. Included is information on construction and installation of its pipe conduit, with both molded and filler insulation, how it is supported, anchored, and guided. Specifications include those for high temperature hot water system.

Circle **Item 86** on Inquiry Card

BLOWERS—General Blower Co., Morton Grove, Ill., announces a four pager which features its perfect circle turbo design. The brochure also includes a large number of blower items in the line and shows several recent installations.

Circle **Item 87** on Inquiry Card

CONDENSING, COMPRESSOR UNITS—Semi-hermetic condensing units and motor compressors from ¼ to 3 hp are described in Bulletin G-124R of The Brunner Manufacturing Co., Utica, N. Y. Units detailed in the bulletin are air cooled, water cooled and air and water cooled.

Circle **Item 88** on Inquiry Card

FOUR CONTROLS HANDBOOKS—Five handy volumes on residential controls, free to dealers, that can be carried in the installers' or servicemen's pockets are published by Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. Each spiral bound and 5 x 8 inches, Vol. 1 is on thermostats, limits, relays, and electric heating; Vol. 2 is concerned with gas controls, Vol. 3 oil controls, and Vol. 4 answers questions pertaining to coal burner controls. Vol. 5, pertaining to residential air conditioning, will follow later in the year. Blank pages for notes are included.

Circle **Item 89** on Inquiry Card

ELECTRIC HEATERS, DEVICES—A 16-page power requirements section, showing short and long form calculations for heating applications, is included in its 1957 catalog, Bulletin GEC-1005H, heaters and heating devices, published by General Electric Co., Schenectady, N. Y. The 72-page publication includes information on such new products as redesigned cartridge heaters, miniature soldering irons, aluminized steel sheath strip heaters, and new ratings and configurations of finned tubular heaters. Also described are the new ceramic-to-metal and plastic resin hermetic seals.

Circle **Item 90** on Inquiry Card

(*Continued on page* 162)

For Sikorsky's new 18-acre plant . . .

Architects and Engineers: F. A. Fairbrother and George H. Miehls, Detroit; with Albert Kahn Associated Architects and Engineers, Detroit, as consultants.

General Contractor: E. & F. Construction Co., Bridgeport.

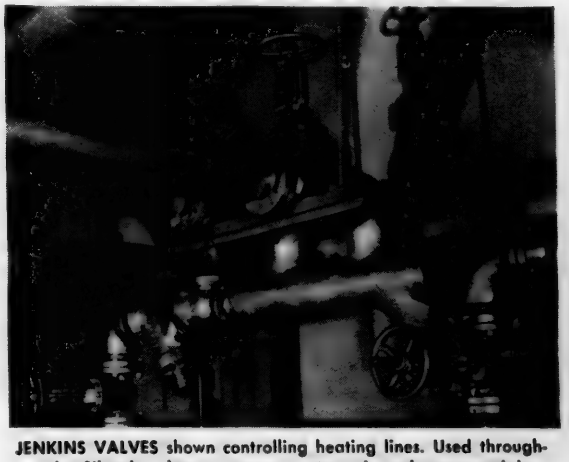
Mechanical Contractor: John Winkle, Inc., Larchmont, N. Y.

Where reliability is the watchword **JENKINS VALVES** were selected

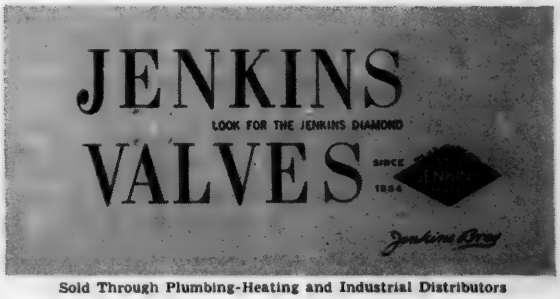
Reliability has characterized Sikorsky Helicopters throughout a long record of military and commercial service. A watchword in the building of these versatile airplanes, *reliability* also was made the critical measure of all equipment for the 18-acre Sikorsky plant recently completed in Stratford, Conn.

On the valves to control much of the complex network of pipelines, management, architects, engineers and contractors found it easy to agree. From long experience on many jobs all could be sure of the reliability of Jenkins Valves.

This confidence in the specification "Jenkins", has been shared by building experts and plant operating men alike for 93 years. The valves that have won this great confidence bear the Jenkins Diamond trademark . . . and *they cost no more*. Jenkins Bros., 100 Park Ave., New York 17.



JENKINS VALVES shown controlling heating lines. Used throughout the Sikorsky plant on steam, water, air and process piping.



Sold Through Plumbing-Heating and Industrial Distributors

EL RANCHO MOTEL,
HOT SPRINGS, ARK.

the

Space-Saving Advantages

and Inner-Fin®

All Copper Construction of

a heat-x 'PC'

PACKAGE

CHILLER

Sold This Job

And this has been the experience of contractors all over the country. Customers are easily "sold" on these units . . . appreciate the sound advice of contractors who recommend them. Here's why:

SPACE SAVING — Patented Inner-Fin® construction makes Heat-X 'PC' Package Chillers the most compact on the market.

RELIABILITY — Non-ferrous construction of all water passages eliminates danger of corrosion. Traditionally rugged Heat-X construction assures long life.

'PC' Chillers also offer the *contractor* several advantages (in addition to consumer satisfaction):

EASE OF HANDLING — Units are lighter in weight and smaller because Inner-Fin® construction permits more chilling capacity with less bulk.

EASE OF INSTALLATION — Units are completely "packaged" . . . require only water and electrical connections.

'PC' Package Chillers are available in 2 HP through 100 HP models. Request complete catalog.

HEAT-X, Inc.

BREWSTER • NEW YORK

NEW CATALOGS

(*Continued from page* 160)

Use the prepaid postcard on page 105 for securing your copies of catalogs described in this department.

INDICATING PNEUMATIC CONTROLLERS—Catalog C-600/700-1, published by Industrial Div., Minneapolis-Honeywell Regulator Co., Philadelphia, Pa., describes Brown Small-Case Indicating Pneumatic Controllers for temperature and pressure in temperature ranges from 0 to 1000 F, and pressure ranges from 0 to 1000 psi.

Circle **Item 91** on Inquiry Card

POPULAR MECHANICAL PACKINGS—A 4-page, 3-color folder listing popular mechanical packings used on all applications in industrial, power, and processing plants is offered by Mechanical Packing Div., Flexrock Co., Philadelphia, Pa.

Circle **Item 92** on Inquiry Card

TOILET COMPARTMENT PLANNING—A sixteen page catalog, No. 570, has been completed by Fiat Metal Mfg. Co., Franklin Park, Ill., detailing in full the application and planning of toilet compartment installations. The catalog shows typical installations of toilet compartments in schools, clubs and institutions of all types. In addition, it gives detailed planning diagrams and dimensional data, so that the catalog can be used as an actual toilet planning work book.

Circle **Item 93** on Inquiry Card

CENTRIFUGAL PUMPS — Eight-page Bulletin No. 4200, from The Deming Company, Salem, Ohio, describes a new line of Motor-Mount centrifugal pumps. The pumps deliver up to 1200 gpm at heads up to 220 ft, and the bulletin contains performance tables and dimensions.

Circle **Item 94** on Inquiry Card

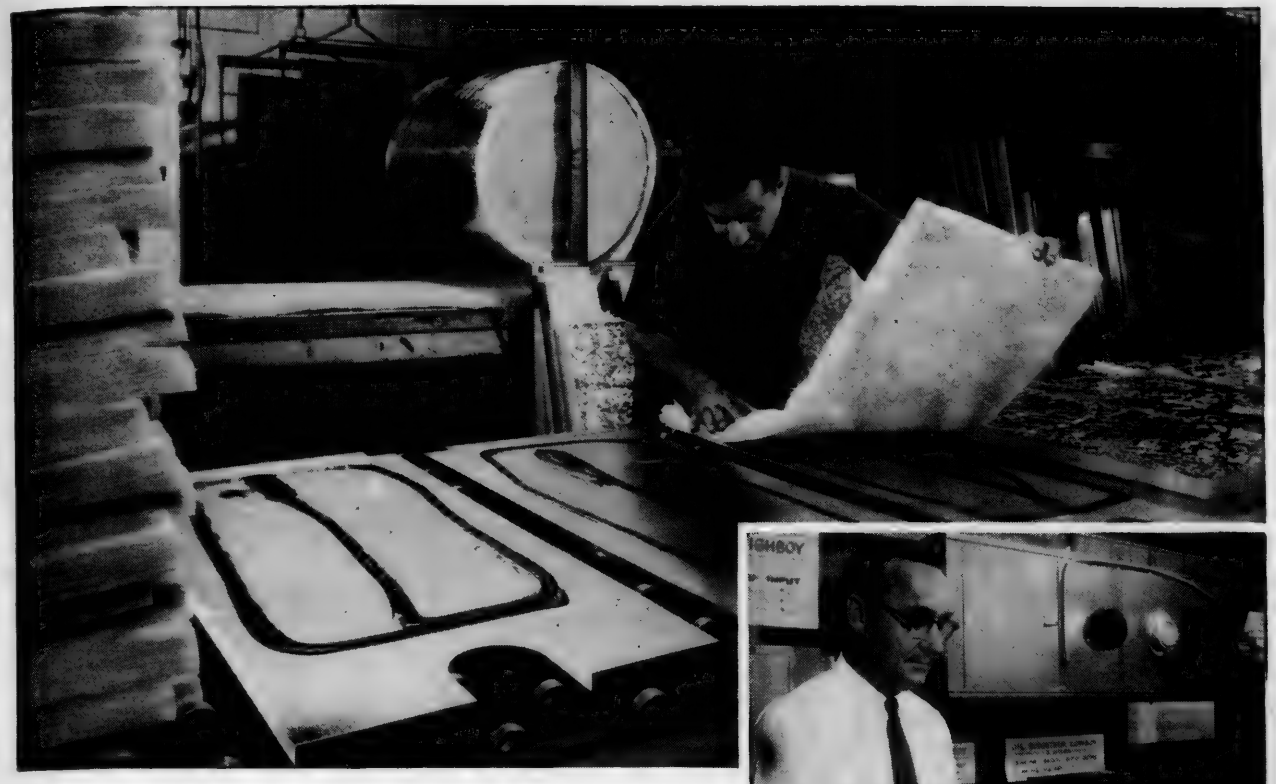
TEFLON LINED PIPE—Two-page Bulletin T-100 published by Halocarbon Div., Haveg Industries, Inc., Wilmington, Del., details the application of tetrafluorethylene resin as a liner for schedule 80 steel pipe. Its thermal, chemical and mechanical properties, sizes, and non-adhesive quality are covered.

Circle **Item 95** on Inquiry Card

COOLING AND VENTILATING FANS—Twelve-page catalog, No. V-316, is published by Hunter Division, Robbins & Myers, Inc., Memphis, Tenn., and describes with specifications and dimensions the company's line of domestic and industrial cooling and ventilating fans.

Circle **Item 96** on Inquiry Card

(*Concluded on page* 164)



Pittsburgh Superfine is applied to Rheem Heater panels. Superfine cuts standby heat loss, increases heater efficiency far above the 80% required by gas and oil companies.

Plant Manager Gordon Cheasley reports that Superfine saves production time and shipping costs, is safer to work with than previous insulating material.

"Thanks to Pittsburgh Superfine, Rheem heaters have the best insulation in the industry!"

says Mr. Gordon L. Cheasley, Plant Manager, HOME PRODUCTS DIVISION
RHEEM MANUFACTURING COMPANY, NEW CASTLE, DELAWARE

"The use of Pittsburgh Superfine helps Rheem five ways in the production of our heaters," reports Mr. Cheasley.

1. **Low heat loss—increased efficiency.** "Pittsburgh Superfine cuts the standby loss of heat in our units and has increased their efficiency to far above the 80% required for approval by gas and oil companies."
2. **Constant resiliency.** "We ship several models disassembled in cartons. Superfine is compressed for packing; yet after a year's compression time, Superfine 'bounces' right back to its original thickness."
3. **Faster production.** "Superfine's lightweight factor saves handling time. Cutting is done quickly and easily. One man can cut, place insulation on eight panels per unit, and pack 25 units a day for shipping."
4. **Safer to work with.** "The insulation material we previously used caused employees discomfort and skin irritation due to glass particles working loose. Superfine's superior quality eliminated this, ended complaints and raised employee morale."
5. **Lower shipping costs.** "Lightweight Superfine saves us 10 lbs. in total weight shipped per carton of panels . . . an important cost-saving factor."

Have you tried Superfine?

Pittsburgh Superfine is ideal for all types of heat and cold insulation, and for sound deadening, too. Get the complete Superfine story from your local PPG Sales Office, or write *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Penna.*

PITTSBURGH SUPERFINE IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh and St. Louis

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PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

for DUST

CONTROL

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FLEXAUST®

HOSE

Made of strong neoprene coated cotton or nylon fabrics spiral wire reinforced.
For *all* kinds of dust collecting uses, particularly good for elbows and moving hoods.
Exceptionally easy to cut, install, connect, reuse, and relocate.
Sizes 1¼" thru 36" i.d.

Write for details today
Distributors in all principal cities

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NEW CATALOGS

(*Concluded from page* 162)

Use the prepaid postcard on page 105 for securing your copies of catalogs described in this department.

VAPOMATIC COILS—Recold Corporation, formerly Refrigeration Engineering, Inc., Los Angeles, Calif., has released a catalog on vapomatic coils (12C7a). New information in the installation instructions include: addition of F-22 defrost line sizes; a more complete wiring diagram, plus a complete description of this wiring diagram. The major change in the specification information section of the catalog is that the dimensional diagram shows the VL-948 Vapot being shipped as a separate item instead of attached as in previous releases.

Circle **Item 97** on Inquiry Card

TIN-LINED PIPE FITTINGS—The Barnstead Still & Demineralizer Co., Boston, Mass., announces the release of Bulletin No. 139 which describes in detail its line of tin-lined pipe, fittings, line valves, faucets and accessories developed especially to protect distilled or demineralized water from metallic contamination. Purified water may now be piped throughout an entire building, from point of origin to point of use, through the use of the manufacturer's piping and accessories.

Circle **Item 98** on Inquiry Card

BAROMETRIC DRAFT CONTROLS—A 2-page illustrated circular describing its line of barometric draft controls for use with oil-fired heating equipment is available from Wm. Steinen Mfg. Co., Newark, N. J. The circular visualizes design and construction features, with drawings and photographs, of regulators from 6 to 32 in. in its RD series. Residential models in 6, 7, 8 and 9-in. sizes, and commercial, heavy duty models in 12 to 32-in. sizes are described.

Circle **Item 99** on Inquiry Card

VENTILATING UNITS—A 24-page catalog on ventilating units is published by Master Fan Corp., Los Angeles, Cal. Vent-All self-contained units are illustrated and technical data is presented.

Circle **Item 100** on Inquiry Card

BRONZE VALVES—Four-page Bulletin DH-25 is released by R-P&C Valve Div., American Chain & Cable Co., Inc., Reading, Pa. It describes the manufacturer's line of solder end and silver-braze end bronze valves in gate, globe and check designs. Included are physical characteristics and construction details.

Circle **Item 101** on Inquiry Card

FAN TESTING—Methods for calculating fan performance from prototype test data and methods of prototype fan testing are described in Bulletin 151, released by the Air Moving and Conditioning Association, Detroit, Mich. The illustrated bulletin explains how production unit fans are tested to obtain accurate performance characteristics for a complete series of fans of the same design and geometrically similar proportions, and of the same or larger size.

Circle **Item 102** on Inquiry Card

COOLING TOWER LINE — Bulletin C-H-5625 issued by Drayer-Hanson Div., National-U. S. Radiator Corp., Los Angeles, Calif., descriptive of company's cooling tower line, designated WMT series, is available for those concerned with selection of equipment that is rated for use with any type refrigeration equipment, or for any process in which water must be cooled. A table of dimensions covering company's 13 standard models is keyed to visual diagrams of unit arrangements. Quick-step selection procedure, charts detailing nominal capacity tons refrigeration and other data are included.

Circle **Item 103** on Inquiry Card

CLOSE-COUPLED INDUSTRIAL PUMPS — An easy-to-use table for determining horsepower, capacity, and head for vertical pumps is included in Bulletin 1100 published by Layne & Bowler Pump Co., Los Angeles, Calif. Also contained are sectional views, material specifications, schematic application drawings, and photos of installations.

Circle **Item 104** on Inquiry Card

GALVANIZED STEEL SHEETS — The facts about galvanized steel sheets for heating and air-conditioning ducts are summarized in Circular No. 4, published by Committee on Galvanized Steel Sheet Research, American Iron and Steel Institute, New York, N. Y. The 8-page brochure is illustrated with pictures of duct installations. Graphs compare thermal expansion, melting temperatures, and tensile strength with other metals.

Circle **Item 105** on Inquiry Card

POLYETHYLENE PIPE—Advantages of service provided by pipe made of the company's polyethylene is described in a brochure published by Bakelite Co., Div. of Union Carbide and Carbon Co., New York, N. Y. A table of specifications for safe working pressures of standard wall pipe, adopted by the pipe industry, is outlined.

Circle **Item 106** on Inquiry Card

LIQUID CHILLERS — Available from Kennard Corporation, St. Louis, Mo., is revised Bulletin No. LC-2 covering direct expansion, shell and tube liquid chillers for Freon 12 and 22, in sizes from 2 to 200 tons capacity. Comprehensive selection, capacity rating, and dimensional data are presented.

Circle **Item 107** on Inquiry Card

THE MARK OF QUALITY

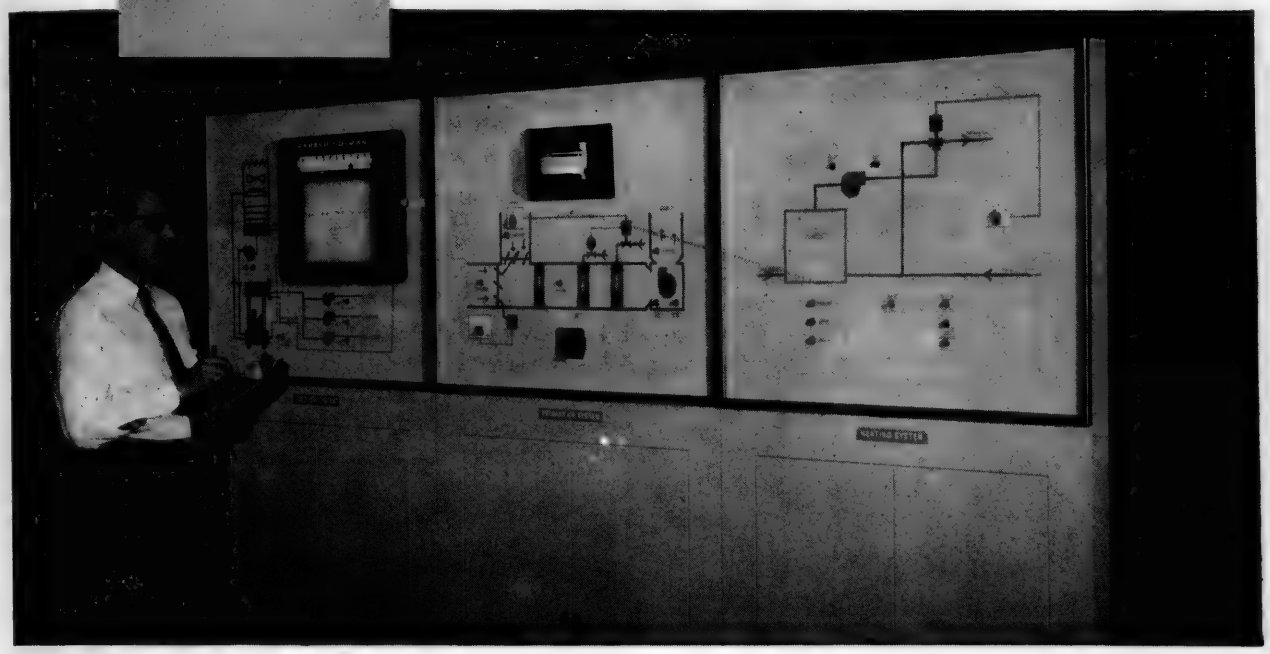
BARBER COLMAN

Electronic Control Centers

1- provide visual supervision of entire heating and air conditioning system and other mechanical or electrical functions

2- provide automatic control

3- reduce installation and operation costs



The most advanced *and* most practical control system for buildings today is the Barber-Colman "Electronic" CONTROL CENTER.

It is a system that provides the central location of "Electronic" components to automatically control and synchronize automatic heating, air conditioning, and many other functions of a building's mechanical and electrical systems. Being custom designed and prefabricated as the nerve center of the control system, a CONTROL CENTER cuts installation costs and adds many new and desirable features.

For the heating and air conditioning system, CONTROL CENTERS may incorporate, as illustrated above, schematic illustration for visual supervision . . . remote control point adjustment of space, duct and flow temperatures . . . and remote temperature indication and recording for reporting and compiling a record of the system's performance. Engineers and architects, who know, have come to recognize the "Electronic" CONTROL CENTER as a complete control package that will improve the performance of any air conditioning system and many other types of mechanical and electrical equipment. Saves time in both supervision and maintenance.

Contact your nearby Barber-Colman Field Office for details. Remember that only Barber-Colman combines skills in both air distribution and automatic controls for *undivided* responsibility.

ELECTRIONIC CONTROL CENTERS BULLETIN

Write for this eight-page color brochure giving detailed information on applications, advantages, functions, and design. Contains photos, drawings, typical schematics, suggested specifications. Write for your free copy of F-8031.

BARBER-COLMAN COMPANY

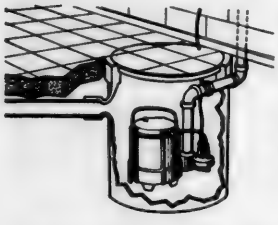
Dept. P, 1302 Rock Street, Rockford, Illinois • Field Offices in principal cities

Automatic Controls • Air Distribution Products • Small Motors • Industrial Instruments • Aircraft Controls • Electrical Components • Overdoors and Operators • Molded Products • Metal Cutting Tools • Machine Tools • Textile Machinery

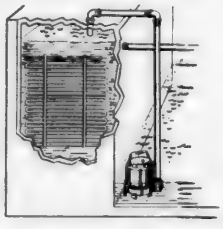
A few of "101" uses for

KENCO
SUBMERSIBLE PUMPS

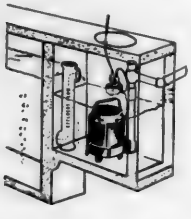
Yes, there are hundreds of applications for Kenco Submersible Pumps! With their amazing capacity—compactness—low center of gravity—portability and *submersible* features, you'll discover new applications—new and better installations never before possible! Here are a few:



Basement Sump Pumps — for a neat, clean, under-the-floor installation. Don't short out — they're designed for complete emersion in liquids. Ideal for dewatering utility pits, loading docks, low areas, elevator shafts, tunnels.



Air Conditioning Units — for water or coolant circulation in original air conditioning and cooling equipment; for removing condensate.



Septic Tanks — use as a disposal unit for septic tanks where the tile field or leaching bed is higher than the tank. Pumps effluent from tank uphill to disposal bed.

MODEL 140 SUBMERSIBLE PUMP

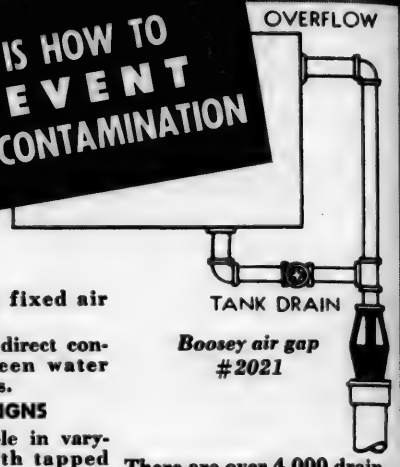
For automatic cycling or continuous duty. Pumps up to 2600 GPH at 5' head. Guaranteed self-priming — air-lock eliminator expels air! Built-in check valve. Dependable switch control — no electrodes, floats, etc. to foul or corrode. Perfect heat dissipation and lubrication.

Get all the facts on the complete line of Kenco Submersible Pumps with capacities up to 5000 GPH. See them at your Kenco Dealer, or write us.

KENCO PUMP DIVISION
1305 Oberlin Avenue • Lorain, Ohio

A DIVISION OF THE AMERICAN CHAIN & CABLE PRODUCTS

THIS IS HOW TO PREVENT WATER CONTAMINATION



Boosey air gap #2021

Install Boosey fixed air gaps!
They eliminate direct connections between water lines and sewers.

TWO DESIGNS

#2021 — Available in varying lengths with tapped inlet and tapped or spigot outlet.

#2030 — Available in one standard length with tapped inlet and outlet.

There are over 4,000 drainage product variations in the Boosey line. (400 floor drain assembly options alone.) Send for a Boosey catalog today.

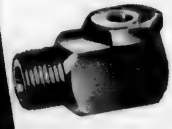
THE NORMAN BOOSEY MFG. CO.
General Sales Office— 5283 Avery Ave., Detroit 8, Mich.

BOOSEY

....to beat sun heat

SPRAY NOZZLES
for evaporative
ROOF COOLING

Reduce indoor temperatures on hot sunny days 10 to 20 degrees . . . decrease cost of air conditioning systems by lowering tonnage needs in refrigeration. Complete choice of spray nozzles . . . non-clogging, Whirljets, with cone spray . . . and water saving Streamjets.



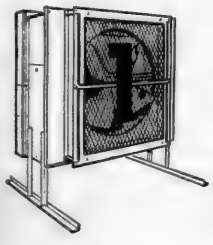
For complete information write for Roof Cooling Bulletin 81.

SPRAYING SYSTEMS CO.
3261 Randolph • Bellwood, Illinois

ADVANCED SPRAY NOZZLE DESIGN FOR NEW DIMENSIONS IN CONTROL AND PERFORMANCE

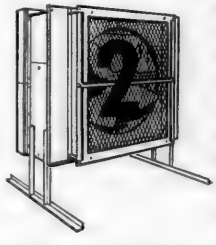
ONLY KRAMER UNICON + WINTERSTAT* GUARANTEES ALL 4

MAXIMUM LIQUID PRESSURE AT EXPANSION VALVE IN WINTERTIME



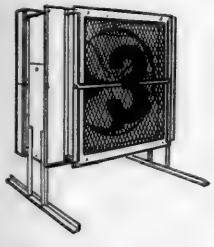
Only the Kramer UNICON plus WINTERSTAT guarantees the full refrigerant pressure *at the expansion valve* for full cooling capacity — even at below 0°F outdoors — *automatically!*

MAXIMUM SUMMER CAPACITY WITH PATENTED WINTERSTAT



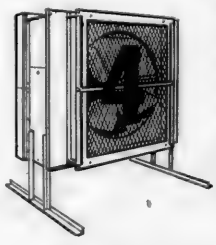
Only Kramer UNICON plus WINTERSTAT guarantees maximum condensing capacity in summer. In hot weather, the patented WINTERSTAT is out of the refrigerant circuit, permitting normal drainage from the condenser without restriction. This assures maximum condensing capacity in summer — *automatically!*

PROMPT DEFROSTING AT ANY OUTDOOR TEMPERATURE



The use of UNICON plus WINTERSTAT makes Kramer THERMOBANK the only low temperature system that can guarantee operation and complete defrosting at any outdoor temperature—even 0°F or lower — *automatically!*

IMMEDIATE COMPRESSOR START-UP REGARDLESS OF OUTDOOR WINTER TEMPERATURE



Only Kramer UNICON plus WINTERSTAT (using modification #1) ensures positive and immediate compressor start-up with pressurestat operating the system, regardless of outdoor winter temperatures at the UNICON and regardless of length of compressor lay-off — *automatically!*

**UNICON is a remote type air-cooled condenser WINTERSTAT is a year 'round automatic head pressure control*

WRITE FOR BULLETIN U-210-L

KRAMER TRENTON CO. • Trenton 5, N.J.

43 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER

MEASURE

ACTUAL AIR DELIVERY

with *Alnor*® **VELOMETER**

A simple, direct reading on the Alnor Velometer gives you instant measurement of actual air delivery in any distribution system. This fast, precise method eliminates the time and money wasted in trial-and-error balancing...the profit-eating call-backs so often necessary with other less precise measurements.

The Velometer is the only instantaneous, direct reading air velocity meter—accurate in all ranges, from high to low... compact, portable, easy to understand and use. Wide assortment of jets and fittings makes this precision instrument ideally suited for all air velocity measurement.

First Choice of Industry

Take the recommendation of every major manufacturer of air diffusers and leading contractors—get an Alnor Velometer. You'll save time and money on the next installation you balance.

Alnor **PRECISION INSTRUMENTS FOR EVERY INDUSTRY**

Illinois Testing Laboratories, Inc.
Room 514, 420 No. LaSalle St.
Chicago 10, Ill.

Please send Velometer Bulletin 2448-G.

Name.....

Company.....

Address.....

City.....Zone.....State.....

SARCO
EASY TO CONVERT SINGLE TO DUPLEX
Simply remove flange of Condensate pump, add a pump-motor with alternator. Reduce your pump inventory!

SARCO PUMPS

CONDENSATE AND VACUUM

give you this big advantage...

UNDIVIDED RESPONSIBILITY
by Sarco for both pumps and heating specialties!

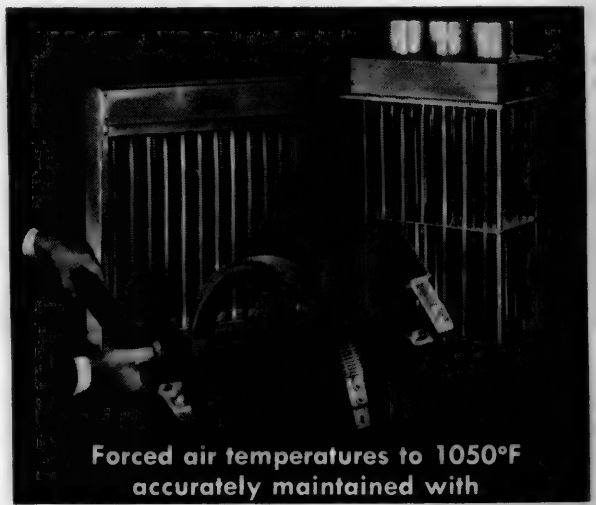
Now Sarco expands its extensive heating line...by adding *condensate and vacuum pumps*...offering you in still larger measure the protection and convenience of *undivided responsibility*.

Shown above is the streamlined Sarco type S condensate pump. Its many advantages include:

Easy conversion of Single to Duplex pump as described in photo — no need to carry full stock of both! Low 7½" inlet. Close coupling.

Write for Sarco Condensate and Vacuum pump bulletins, to Sarco Company, Inc., Empire State Bldg., N.Y. 1, N.Y.

SARCO



Forced air temperatures to 1050°F accurately maintained with

CHROMALOX *Electric* **Air Duct Heaters**

For heating air or gases under forced circulation, Chromalox Electric Air Duct Heaters are the efficient, economical answer.

For drying, curing, baking. For heat-treating and annealing ovens. Space heating or adapting air-conditioning systems for central heating.

Heaters can be installed quickly and easily in round or rectangular ducts and accurately controlled either manually or by automatic thermostat.

115, 208, 230 and 460 volts. 91 *standard stock* types, sizes and ratings are ready for immediate delivery.

C-2109

FREE BULLETIN — Call your Chromalox Representative or write for Bulletin F-1559

Edwin L. Wiegand Company
7588 Thomas Boulevard, Pittsburgh 8, Pa.

Hide-a-way air conditioner is mounted above hallway

Building housing refrigerating system has cooling tower, with fans, on roof

Frick "ECLIPSE" compressors cooling 256 Woodlane Apartments

256 Luxury Apartments near Dallas Equipped with

TRADE FRICK MARK®

Air Conditioning

The Woodlane Apartments comprise 18 buildings, covering four city blocks. Built and operated by Corrigan Properties, Inc., they offer year-'round air conditioning, among other attractions; people wait for a chance to rent them.

Beatty Engineering Co., Frick Air Conditioning Contractors in Dallas, designed and installed the year-'round system. Four Frick "ECLIPSE" compressors furnish 400 tons of refrigeration. Both the owners and occupants are much pleased with results.

You, too, will be pleased with Frick equipment—whether for air conditioning, ice making, quick freezing or other refrigerating work. Get bulletins and estimates now: write

DEPENDABLE REFRIGERATION SINCE 1882

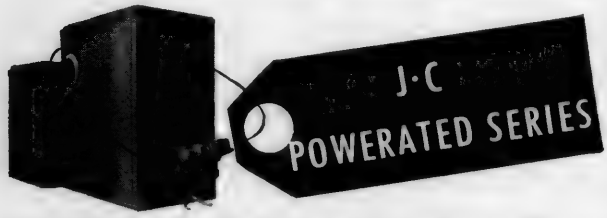
FRICK CO.

WAYNESBORO, PENNA., U. S. A.

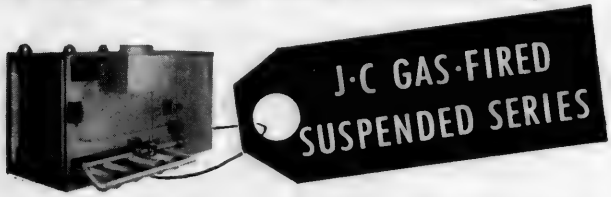
Also Builders of Power Farming and Sawmill Machinery

JACKSON & CHURCH FURNACES

HANDLE DIFFICULT HEATING JOBS



Jackson & Church engineering has produced a new Powerated furnace line which matches today's heaviest duty requirements. These new furnaces develop static pressures up to 1½" W. C. with lock-seam, leakproof casings designed to carry the heaviest air load over the unit for air conditioning. Oil, gas or dual-fuel firing with outputs from 152,000 to 3,800,000 Btu. The J-C Powerated Series incorporates the latest advances in modern industrial and commercial heating.



Available for heating plants, stores, churches, schools and other large structures, these new gas-fired models have inputs of 200,000 to 400,000 Btu, with some units approved either as horizontal furnaces or as blower type heaters. These J-C units provide the convenience of gas firing plus all the advantages of suspended type heating such as savings in floor space and almost limitless zone heating possibilities. Drawer type burners for easy accessability, easy installation. J-C gas-fired suspended furnaces are built for minimum maintenance.

Space-saving oil-fired suspended models, available in a wide range of sizes with outputs of 89,000 up to 1,000,000 Btu, these easily installed units are most versatile in application. They can be installed singly or in batteries, and can supplement other heating for plant expansion and they are readily adapted to year round air conditioning. These dependable units solve many commercial and industrial heating problems.

With outputs from 400,000 to 2,000,000 Btc, and available for oil, gas or dual-firing, J-C Direct-Fired units are ideally adapted for large commercial or industrial heating jobs. They may be installed on the floor, or suspended either inverted or horizontally. They are self contained, automatically controlled units equipped with induced draft fan and air circulating blowers. J-C Direct-Fired Unit design makes savings possible in both installation and maintenance costs.

J-C | JACKSON & CHURCH — FURNACE DIVISION
Saginaw, Michigan

LOW INSTALLATION

AND MAINTENANCE COSTS

. . . plus added years

of dependable service

•

TODD BURNERS

GAS OR OIL

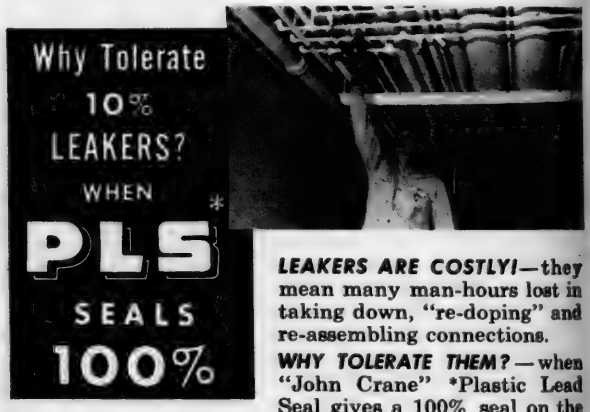
•

PRODUCTS DIVISION

TODD SHIPYARDS CORPORATION

Headquarters:
Columbia and Halleck Streets,
Brooklyn 31, N. Y.
Plant:
Green's Bayou, Houston 15, Texas

TODD
NEW YORK HOUSTON



LEAKERS ARE COSTLY!—they mean many man-hours lost in taking down, "re-doping" and re-assembling connections.

WHY TOLERATE THEM?—when "John Crane" *Plastic Lead Seal gives a 100% seal on the original connection. And you don't have to worry about service, temperatures or pressures—PLS withstands water, steam, oil, gas, refrigerants, chemical and petroleum products—temperatures to 550°F., and pressures to 6000 psi.

Use PLS on pipe joints, plugs, screwed fittings, flanges and gaskets.

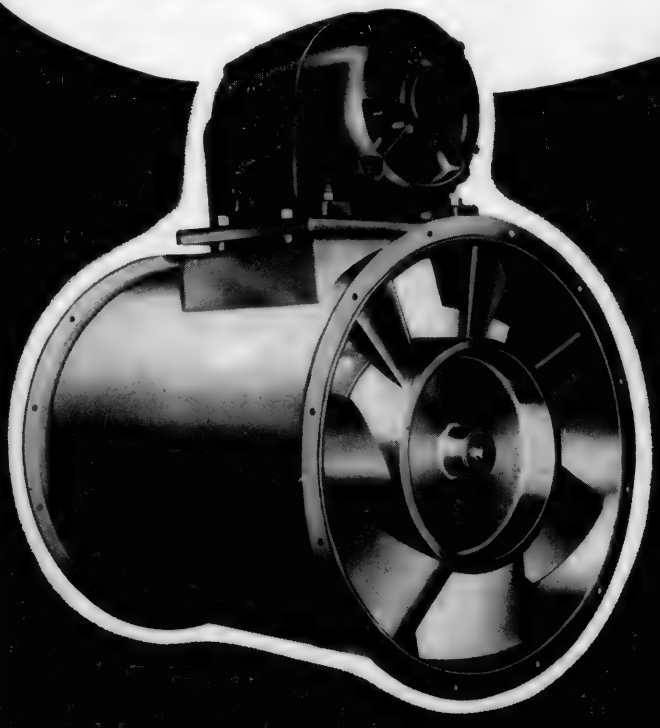
Send for free sample or trial order. In 4-oz. tubes, 1-lb. brush or friction top cans, 5-lb. cans, 15 and 28-lb. pails, and 85-lb. drums.

Crane Packing Company, 6431 Oakton St., Morton Grove, Ill., (Chicago Suburb)
In Canada:
Crane Packing Co., Ltd., Hamilton, Ont.

7 REASONS WHY

Hartzell Vaneaxial Blowers

- LAST LONGER
- DO A BETTER JOB



Belt-drive model (shown) available in sizes from 12" to 54", standard or high-temperature construction. Also available in direct-drive models, 18" to 42". These blowers operate efficiently against pressures as high as 10", deliver up to 87,000 CFM. For complete details, write for Bulletin A-110 or call your nearby Hartzell field engineer.

- Heavier gauge steel throughout — outer shell steel ranges from 14 gauge on 12" models to ¼" plate on 54" models — to evaluate strength of construction, compare net weights before you buy.
- Precision-cast, aluminum alloy impeller, dynamically balanced to prevent vibration.
- All-welded construction — guide vanes are welded to both inner and outer shells — there's nothing to work loose and vibrate.
- Certified ratings—all Hartzell blowers are tested for air deliveries according to the Standard Test Code.
- Easy maintenance—ball bearing pillow blocks are Alemite lubricated from outside the duct section — belts can be changed by removing one small plate.
- Belts totally enclosed to prevent damage by elements in the air stream . . . yet easily adjusted by turning two bolts.
- Top quality motors supplied by nationally recognized manufacturers.

Why You Can Count on Hartzell Air-Moving Equipment for Long Life, Rugged Reliability and Minimum Maintenance

Hartzell fans and blowers are engineered and built for the exacting requirements of tough industrial service. There's no compromise with quality for the sake of shaving a few dollars on price. Hartzell fans are designed for the industrial buyer who is willing to pay for long life, dependable service and low maintenance.

HARTZELL
PROPELLER FAN CO.
Div. of Castle Hills Corp.

103 Thomas Blvd. • Piqua, Ohio

ENGINEERING OFFICES IN PRINCIPAL CITIES

THE WORLD'S MOST EFFICIENT POWER EXHAUSTER

...for industry...for institutions...for residences

★ NO MOTORS, FANS OR BEARINGS IN EXHAUST LINE
★ NEEDS NO STACKS ★ ACID RESISTING VITREOUS ENAMEL FINISH

FOR INDUSTRY, Quickdraft excels in venting paint booths . . . abrasives . . . corrosive gases . . . noxious fumes . . . high temperatures and moisture. Its blower operates in clean or outside air. It eliminates down-time for cleaning and replacing fan blades. It improves industrial venting and reduces maintenance costs!

FOR INSTITUTIONAL AND COMMERCIAL BUILDINGS, Quickdraft efficiently vents heating plants, water heaters and incinerators at roof level. It saves the cost of building unsightly tall stacks.

FOR RESIDENCES, Quickdraft makes low, cold and erratic chimneys function. On and off with the fire, Quickdraft maintains constant draft required for efficient and economical combustion of all fuels. It eliminates pulsating or chattering, puffing, smoking and sooting.

SEND FOR QUICKDRAFT ENGINEERING DATA ON YOUR VENTING OR HEATING APPLICATIONS . . . TODAY.

Capacities of 56 standard and heavy duty models (6 to 30 inches diameter) . . . 8,400 CFH to 1,005,960 CFH . . . greater capacities on special order.

Quickdraft COMPANY

P. O. Box 87-O • Canton 1, Ohio

N-484-QD

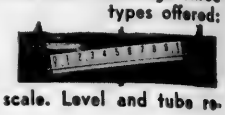
Quickdraft Company
P. O. Box 87-O • Canton 1, Ohio
Please send Quickdraft engineering data for
☐ Industrial Exhausting
☐ Commercial Heating Plant
☐ Residential Heating Plant

Firm _____
Individual _____ Title _____
Street _____
City _____ Zone ___ State _____

√Take your choice!

ELLISON AIR FILTER GAGES IN 3 TYPES

Ellison Air Filter Gages are high precision instruments —not dime store gadgets. Built for a lifetime of dependable service. Widely used in public buildings, hotel, hospital and office buildings. Three types offered:



Inclined Tube Type

Accurately indicates air flow resistance in duct at air filter. Easy-read white enamel scale. Level and tube replaceable on the job. Easily installed.

Diafram Actuated, Dial Type

High powered, free floating diafram. Accurate pointer mechanism floats on knift-edge bearings. Easy to read—readily installed.

Bell Actuated, Dial Type

Bell submersed in oil pan actuates the accurate mechanism which floats on knife-edge bearings. Bell oil easily replenished through inlet at top.

● *Ask for Air Filter Gage Bulletin 214.*

ELLISON DRAFT GAGE CO., INC.

542W. MONROE ST. Since 1896 CHICAGO 6, ILL.

The Ellison Line Also Includes:

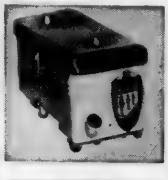
Draft Gages, Bell and Diafram—Inclined Draft Gages—Portable Inclined Vertical Tube Gages—Vertical Tube Gages—Oil, Heavy Liquid and Mercury—Single and Multi-Tube-Saturator Gages—U Gages—Stationary and Portable—Air Filter Gages—Dial and Inclined Tube Types—Pitot Tubes—U Path Steam Calorimeters—Portable Gas Analyzers-Orsat Type

MARCH CONDENSATE PUMPS

• COMPACT — FIT INSIDE ANY A.C. OR REFRIGERATION UNIT

• FIT EQUIPMENT OTHER PUMPS CANNOT HANDLE

Specially designed to conquer air lock. Assure automatic and positive priming over long distances and high lifts . . . through patent-applied-for features. Only a fraction of the cost of gravity lines. In-pan or out-of-pan mounting, all inside unit. Thermal protected. Year warranty. Complete line.



FLOAT-O-MATIC MODELS—(left) in-pan or out-pan automatic float control. A-F has vertical lift up to 6 feet, horizontal to 200 feet. B-F, vertical lift up to 9 feet, horizontal to 300 feet.

UNIVERS-L-MOUNT OUT-OF-PAN MODELS — A-S lifts 6 feet, handles 200 feet horizontal runs. B-S lifts 9 feet with runs of 300 feet. Cycle with A.C. controls. Mounts below drip pan.

Also standard in-pan units. Write for data.

MARCH MANUFACTURING CO., INC.
8017 NORTH LAWNDALE • SKOKIE, ILLINOIS

EXCLUSIVE DESIGN • OUTSTANDING PERFORMANCE

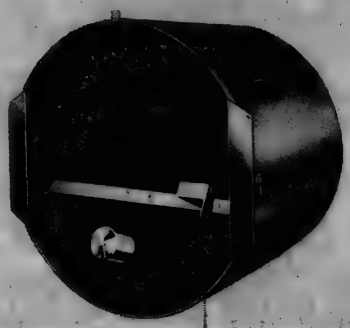
DEPENDABLE,

PRECISELY ACCURATE

Draft Control

for coal fired, oil fired, gas fired or gas-oil fired

HEATING PLANTS



FIELD TYPE "M" for coal and oil fired heating plants

Heavy duty commercial model in 28" and 32" sizes. Heavy, rigid construction assures long, trouble free service. Stainless steel knife edge bearing for permanent sensitivity. Also available in 6" through 24" sizes for domestic and commercial installations. First choice of heating men — the round control you can level on any flue.

FIELD TYPE "MG" for gas and gas-oil fired heating plants

A heavy duty, precision built control in sizes 8" through 32" for commercial and industrial installations. Stainless steel knife edge bearings for permanent sensitivity. Gate opens inward to regulate updrafts, and outward to relieve down-drafts. Optional safety switch available where codes require. Fully proven, accepted virtually everywhere.

They're real HEAVYWEIGHTS

Compare the weight of a Field Control to any other available. Here is proof of the massive, welded construction, long, vibration-free service, that permits Field's supreme accuracy.

Size Control	Gate	Thickness of Parts Side Plates	Ring	Collar	Wt. without Crtn. or Crate
14 M	16 Ga.	16 Ga.	⅜ x 2"	22 Ga. Galv.	19#
16 M&MG	16 Ga.	16 Ga.	⅜ x 2"	18 Ga. Galv.	28#
18 M	16 Ga.	16 Ga.	⅜ x 2"	18 Ga. Galv.	35#
20 M&MG	16 Ga.	16 Ga.	½ x 2"	18 Ga. Galv.	41#
24 M&MG	14 Ga.	16 Ga.	½ x 2"	18 Ga. Galv.	65#
28 M&MG	14 Ga.	14 Ga.	½ x 4"	14 Ga. H.R.S.	110#
32 M&MG	14 Ga.	14 Ga.	⅝ x 4"	14 Ga. H.R.S.	140#

field

FIELD CONTROL DIVISION
of H. D. CONKEY & COMPANY, Mendota, Ill.

Affiliates

Conco Building Products, Inc. • Brick, Tile, Stone
Conco Materials Handling Division • Cranes, Hoists

NEW ECONOMY IN RADIANT HEATING...

...is now possible with the completely integrated SIMPLEX radiant-acoustical ceiling.

One trade rapidly installs this *one* completely integrated ceiling which includes all radiant ductwork, aluminum acoustical panels, diffuser panels and framing for recessed fixtures. *One* medium, air, is responsible for heating, cooling, ventilation and humidity control.

The result is a system which combines the speed of response and installation economy of forced air systems with the superior comfort of radiant heating and cooling—at prices which have competed successfully with quality conventional forced air systems of heating and air conditioning.

(Above) Some 30,000 sq. ft. of SIMPLEX radiant-acoustical ceiling help keep patients in the new Beckley Memorial Hospital, Beckley, W. Va., comfortable. Archt: Isadore Rosenfield, Engr: John D. Dillon, both of N. Y.

(Right) Attractive anodized aluminum ceiling surface is free of conventional air diffusers and dirt rings. Station Master's Office in Grand Central Station, N. Y.

Send today for AIA booklet containing photographs, details and specifications.

SIMPLEX CEILING CORP.

552 W. 52 St., New York 19, New York

Please send me folder 39b describing your radiant-acoustical ceiling.

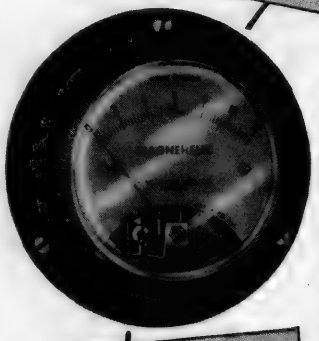
Name .....

Firm .....

Address .....

City ..... Zone..... State.....

"MAGNETIC COUPLING"
Exclusive Feature of
DWYER
MAGNEHELIC PRESSURE GAGE



The unique design cannot be harmed by sudden pressure surges, shock loading or severe vibration. For accuracy, sensitivity, and long service life the Dwyer Magnehelic Gage cannot be equalled.

Extreme accuracy results from the elimination of friction between the flexible diaphragm and the indicating mechanism. A magnetic force transmits pressure fluctuations to the 3½" easy-to-read dial of the Dwyer Magnehelic Gage.

Send for Bulletin No. 250 for complete description today.

A Precision Instrument Sensitive to Pressure, Pressure Differentials or Vacuum from 0-1" water or 0-2 psi.

F. W. DWYER MFG. CO.

P.O. BOX 373-N MICHIGAN CITY, INDIANA

HARRIS

for any liquid for high pressures
for high temperatures

If you have a liquid level control problem that involves a float, send for Harris Float Catalog with its complete technical data on the various types, sizes of floats, and the metals suitable for different corrosive liquids, temperatures, and pressures.

Harris Floats are made in sizes from 2½" to 14" diameter in ball, cylinder, conical, rectangular or disk shapes of Copper, Stainless Steel, Aluminum, Nickel, Monel, or Steel or other suitable, workable metals.

Harris engineers, with a background of 72 years of experience, will be glad to help you select or design the right float for your installation.

Write today for Harris Float Catalog with complete technical data.

ARTHUR HARRIS & CO.

206 No. Aberdeen Street, Chicago 7, Illinois

FLOATS

here's the economical answer to

Classroom Comfort

Norman Gas-Fired Schoolroom Heating and Ventilating System

In one complete package for the individual classroom, Norman engineers have designed everything needed to assure economical and healthful classroom comfort — automatically.

And, because the Norman gas-fired, forced air heating and ventilating system is specifically designed for modern schools, it offers important advantages for new school construction and expansion programs. No separate building or extra space is needed for a central heating plant. Simplifies expansion programs — just add another Norman unit for each additional classroom.

NORMAN COMPLETE PACKAGE PROVIDES:

- Perimeter forced air distribution at proper angles for constant classroom comfort without draft or stale air pockets.
- Automatic operation cycles which include warm-up, daytime or occupied period, and nighttime period.
- Automatic ventilation with proper mixture of outdoor air and room air.

NORMAN COMPLETE PACKAGE INCLUDES:

- Automatic gas-fired, forced air central heating furnace and enclosure, pre-wired and fire-tested at factory.
- Standard length Util-i-Duct sections of sturdy furniture gauge steel, shipped ready to install. Each section includes quality adjustable perimeter diffuser . . . aluminum trim for front top edge . . . resilient gasket for back top edge. (Filler and corner sections available.)
- Electrically controlled multi-blade air damper assembly for automatic inside and outside air modulation.
- Rugged aluminum outside weather grilles and mounting frames for fresh air and combustion air openings.
- Automatic controls for complete modulation of heating and ventilation air requirements.

OUTSIDE AIR ONLY USED FOR COMBUSTION

Mail the coupon today for complete details and specifications.

Norman®
products company

NORMAN PRODUCTS CO.
1166 Chesapeake Ave., Columbus 12, Ohio

Please send complete information and specifications on the Norman Gas-Fired Schoolroom Heating and Ventilating Package.

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FIRM NAME_____

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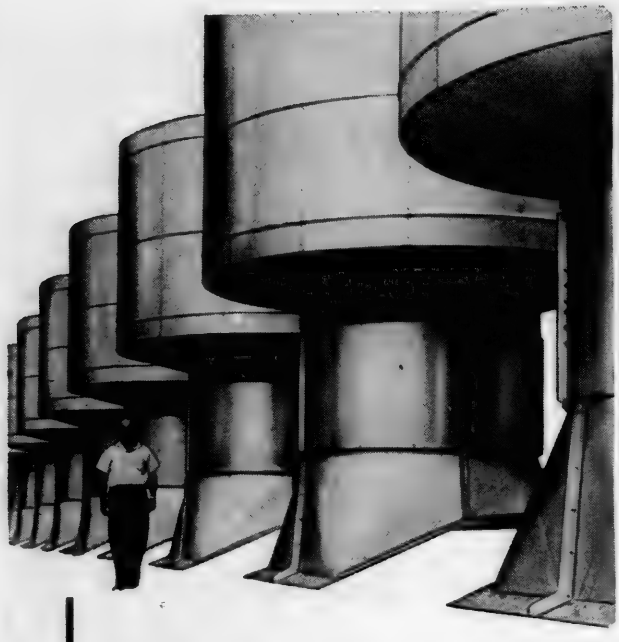

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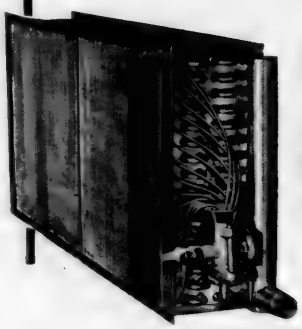

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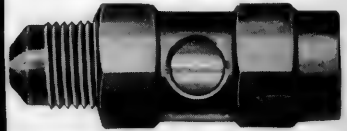

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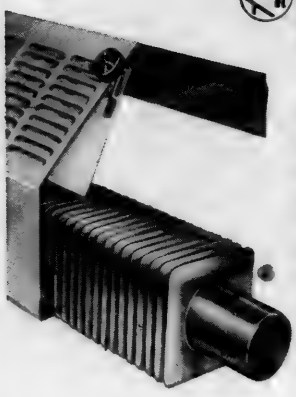

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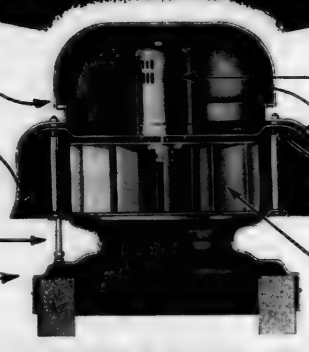
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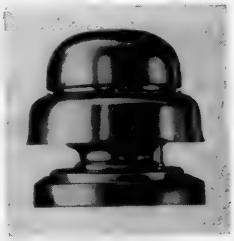

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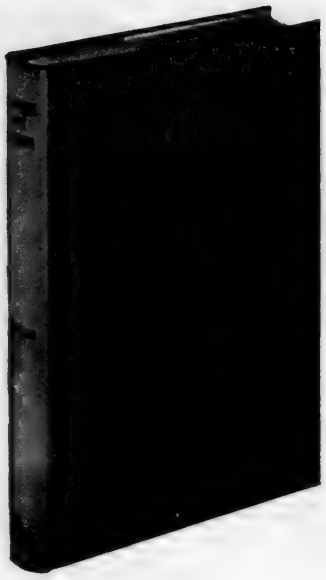

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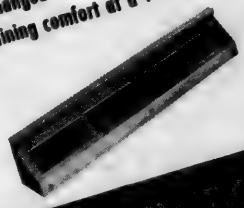

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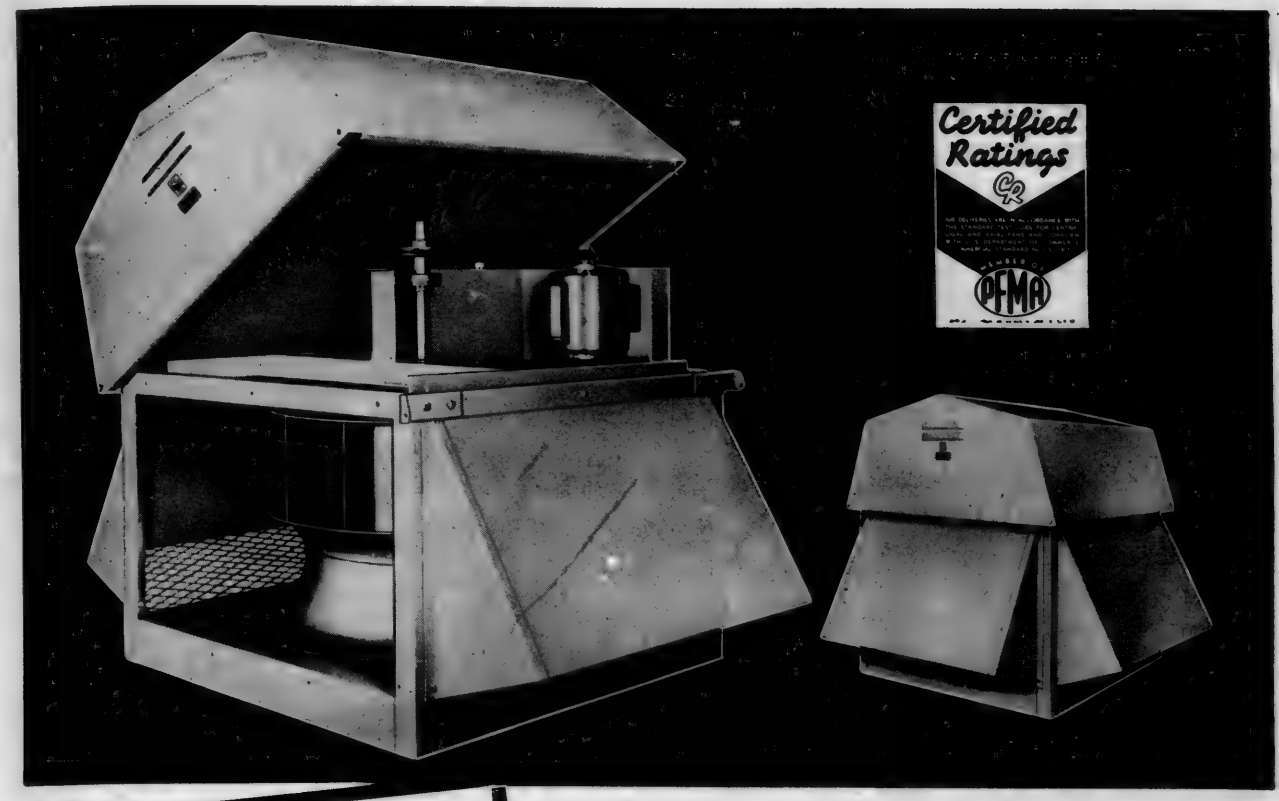

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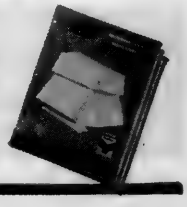

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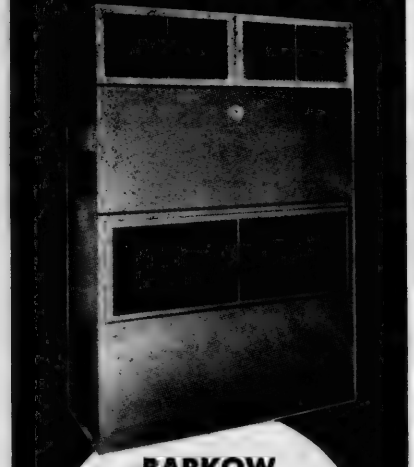

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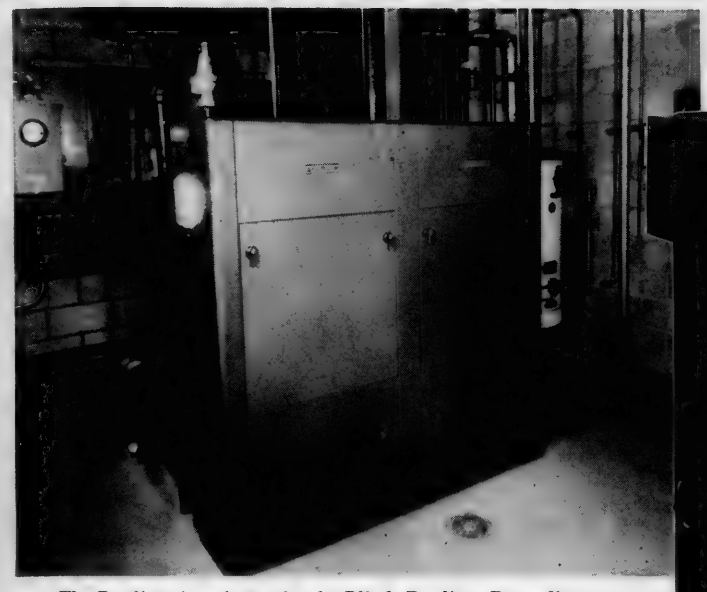

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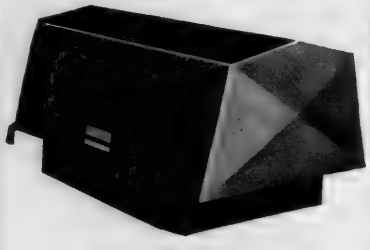

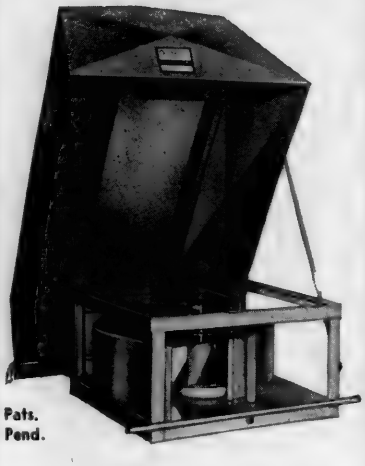

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100,000 to 5,400,000 BTU/hr.

UL LISTED

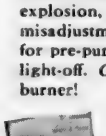
GAS **syncro flame** GAS

NEW POWER GAS BURNER FILLS IMPORTANT NEEDS

Be *sure* you know about SYNCRO/FLAME whenever you have a job that calls for a good forced-draft gas burner! This one is designed for boilers in the range of 10 to 150 h.p. It comes in seven sizes, of different capacities, and it is outstanding for unusual and valuable features. Among them are . .

NON-PULSATING FLAME EXPLOSION-FREE CIRCUIT

Adept engineering has achieved a flame that positively does *not pulsate* on starting or stopping, thus completely removing a common objection. Also, a new control circuit virtually eliminates *any* chance of explosion, even under conditions of bad misadjustment. Circuits are also provided for pre-purge, post-purge, and graduated light-off. *Certainly*—a *great* power gas burner!



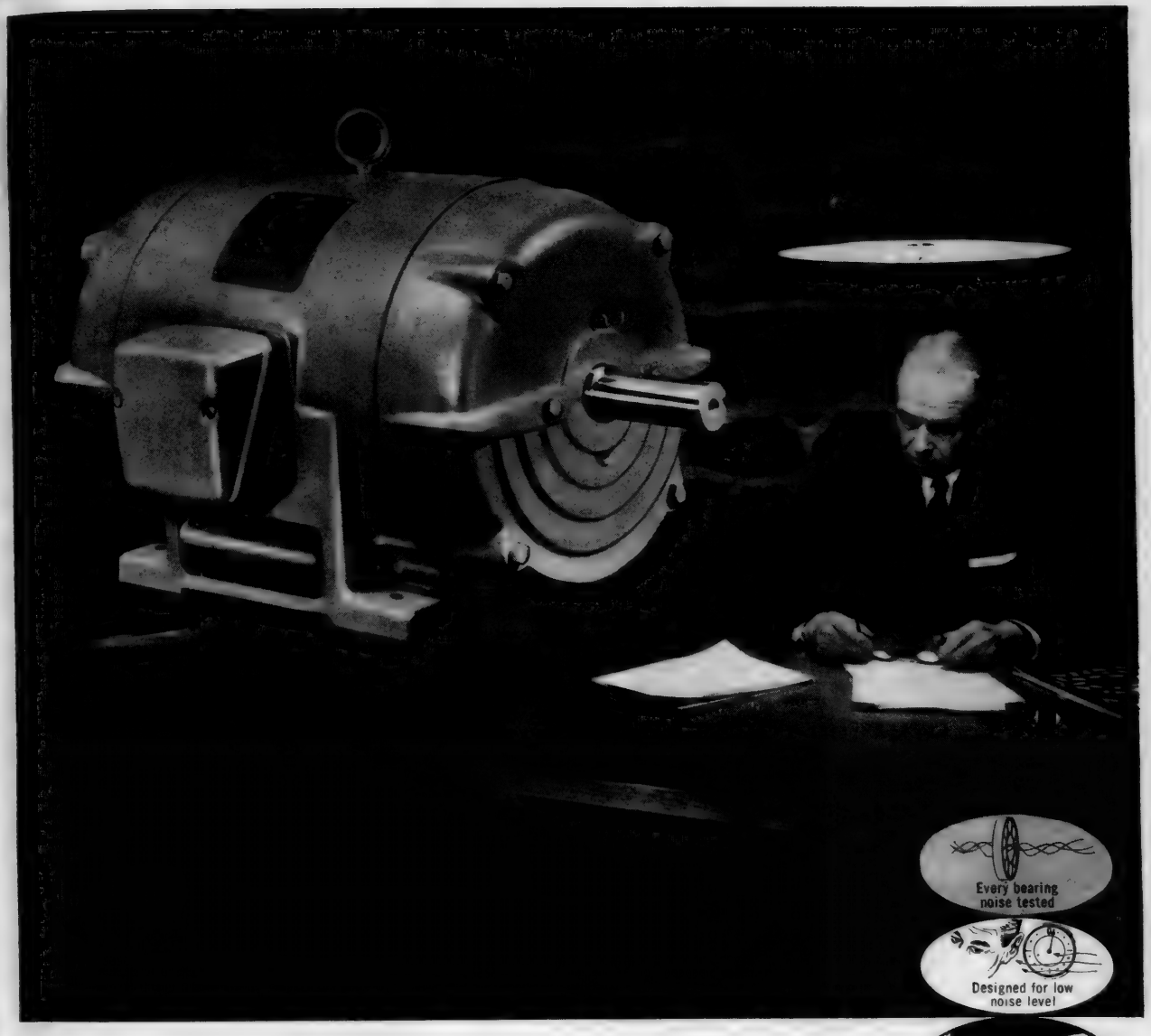
WRITE FOR LITERATURE

Write today for circular describing all features and giving full specifications. Ask for Bulletin 533.

MANUFACTURERS OF OIL AND GAS AND OIL/GAS BURNERS

SYNCHRONOUS FLAME, INC.

WALWORTH • WISCONSIN



Air conditioned comfort without hum

Commercial air-conditioning installations use Louis Allis "quiet" motors

In today's modern executive and general offices, silent operation is a prime specification for the air-conditioning installation. Busy people suffer adversely from any resonance or hum induced in the system by the drive motor. Efficiency drops — irritability climbs — and worker output falls.

That's why Louis Allis motors — the motors with the built-in "hush" — are finding wide acceptance in air-conditioning service. They are specifically *designed* to be quiet. Every bearing is noise tested . . . end bells and frame are engineered for low, low noise levels . . . sturdy, heavy-section cast-iron housing construction is remarkably resonance-free.

Matching this desirable operating characteristic is dependable maintenance-free construction: locked bearings mean extra long bearing life, and Louis Allis insulation protects against moisture and heat to assure steady, dependable performance even under the most adverse operating conditions.

Make us prove it. Contact your Louis Allis District Office and arrange to have an expert motor sales engineer stop by and advise you on your air-conditioning drive installation. Or write the Louis Allis Co., 454 East Stewart St., Milwaukee 1, Wisconsin.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

Get the Answers!

To your equipment installation problems

If you work with—

CENTRIFUGAL COMPRESSORS

RECIPROCATING COMPRESSORS

COOLING TOWERS

AIR HANDLING UNITS

PACKAGED LIQUID CHILLERS

FANS

BLOWERS

PUMPS

PIPING

BOILERS

UNIT HEATERS

or What have you?...

Korfund's complete line of products give you the right answer the first time to your installation, vibration and noise problems. Write for Bulletin 44 which gives full details.

THE **KORFUND** COMPANY, INC.

48-01E Thirty Second Place, Long Island City 1, N.Y.

In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

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DO YOU HAVE A TWO-STAGE PRESSURE OR TEMPERATURE CONTROL PROBLEM

MERCOID® HAS THE SOLUTION

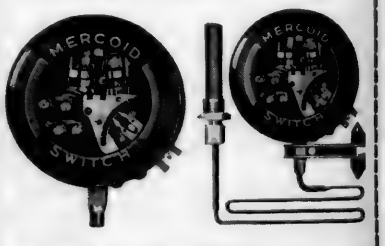
Mercoid DA-400 Series Controls are dual purpose controls (available for pressure or temperature) incorporating a single element operating two separate independently adjustable Mercoid magnetic mercury switches. Circuit arrangements can be supplied for various operations, a few examples are:

1. Close one alarm circuit at high setting and a separate circuit at low setting. Both circuits remain open between the high and low operating points of the two switches.

2. As an electrical interlock to open one circuit on a rise above, and the second circuit on a drop below the set operating point.

3. To provide two-stage control by opening one circuit on a rise and a second circuit on a further rise.

***Pressure types* available in 17 different operating ranges from 0-30" vac. to 300-2500 psi. *Temperature types* available in 11 operating ranges from -30-60°F. to 370-530°F.**



All types are equipped with external adjustments and visible calibrated dial.

Our engineers are at your service—send in your control problem or

WRITE FOR BULLETIN CA-PT

THE MERCOID CORPORATION
4211 Belmont Ave., Chicago 41, Ill.

weil PUMP'S

New SUBMERSIBLE SUMP PUMP

Built for - Automatic Submerged Operation

A PACKAGED UNIT . . . . priced lower than many conventional Sump Pumps

Designed-

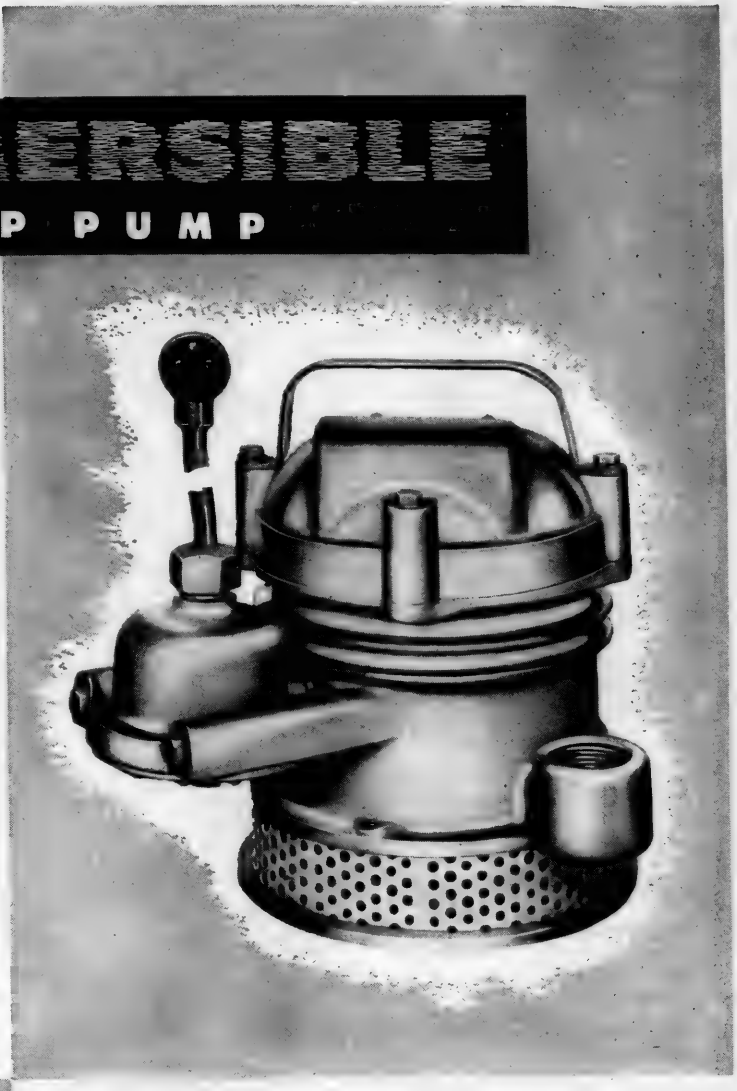
TO OPERATE UNDER WATER
Hermetically sealed motor with a leak-proof rotating shaft seal assures dependable performance at all times.

FOR ECONOMICAL INSTALLATION
Is easily installed in a metal tile or concrete sump 2′ to 8′ deep.

FOR SMALL SUMPS
Can be installed thru a 15″ opening.

FOR GAS-TITE INSTALLATIONS

FOR FLOOD-PROOF OPERATION
If current fails moisture cannot damage pump or motor.



Choice OF 3 CONTROLS

PRESSURE SWITCH
Fool-proof and trouble-free. Recommended for most installations.

ELECTRODE
For special installations where clear water is being pumped.

FLOAT SWITCH
For Duplex Units. Operates pumps alternately or together as conditions demand.

MOTOR: 1/3 HP, 1750 RPM, 110 volt **CAPACITOR TYPE** with 8 ft. waterproof cable and plug
IMPELLER: Bronze
SCREEN: Brass
BASE: Sturdy cast-iron
DISCHARGE: 1¼″
SHAFT: Stainless steel
DIMENSIONS: Height: 11″; Diameter: 11¾″; Weight: 50 lbs.

PERFORMANCE

Discharge Head (Ft.)	5	10	15	20	22	24
Capacity, GPH	3600	3350	2400	1830	1160	540

NEW PRESSURE SWITCH MODEL SS-800 ILLUSTRATED

Engineered for One Million Starts . . . without attention

weil PUMP CO.

1516 North Fremont Street
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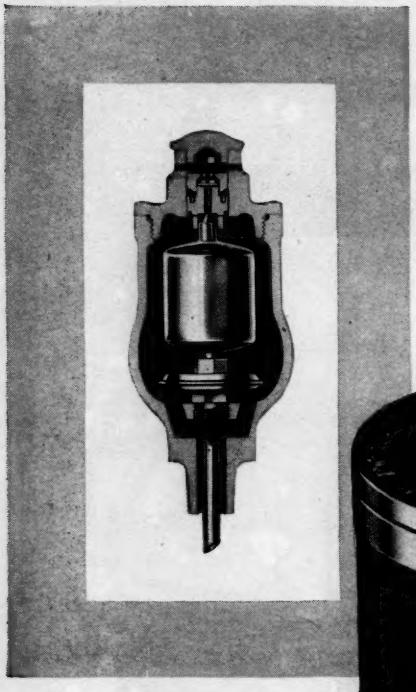


A well placed air vent can work a heating miracle!

In a Wilmette Illinois Building, an outwardly well-engineered vacuum system had been a headache for years. Then, last winter, along came a heating man who quickly sized up the situation and said with real conviction: "Put a Marsh No. 5 Vent right there!"

That did it! One inexpensive vent cleaned up a spotty, erratic condition, that a number of expensive alterations had failed to touch.

Unusual? Not in the least: over the years we have seen a lot of wonders worked by installing the right kind of Marsh air vent in the right spot. A number of these dependable vents are illustrated here . . . products that express an unrivaled accumulation of knowledge in dealing with air venting problems.

Marsh air vents are fully covered by the Marsh Heating Specialty Catalog along with Marsh Traps and Valves. Your local Marsh man will be glad to work with you in applying Marsh Vents effectively.

No. 5 Rapid Vent. Float and thermostatic construction. Designed for use at the end of steam mains, tops of risers and other similar locations on vapor and one pipe vacuum systems where the maximum venting requirement does not exceed one cubic foot per minute at 5 psi.

No. 6 Quick Vent. Thermostatic only. Designed for installation at high points in the piping where there is not sufficient room for the No. 5 Vent or where a float is not needed. Same venting capacity as No. 5.

No. 50 Air Vent. Float only. Designed to remove air and gases automatically from hot or cold water tanks, coils or piping, liquid pump systems or similar applications where it is necessary to vent air rapidly. Maximum working pressure, 125 psi.

No. 55 Air Vent. Float and thermostatic construction. Is capable of expelling large volumes of air without passage of water or steam and is designed for use on steam pressure vessels or systems. Maximum working pressure, 125 psi.

No. 7 Air Eliminator. Float and thermostatic construction. Expecially suitable for installation at the ends of steam mains, return piping and tops of risers where it is necessary to expel a large volume of air from the system. Suitable for working pressures up to 15 psi.

MARSH HEATING EQUIPMENT CO.

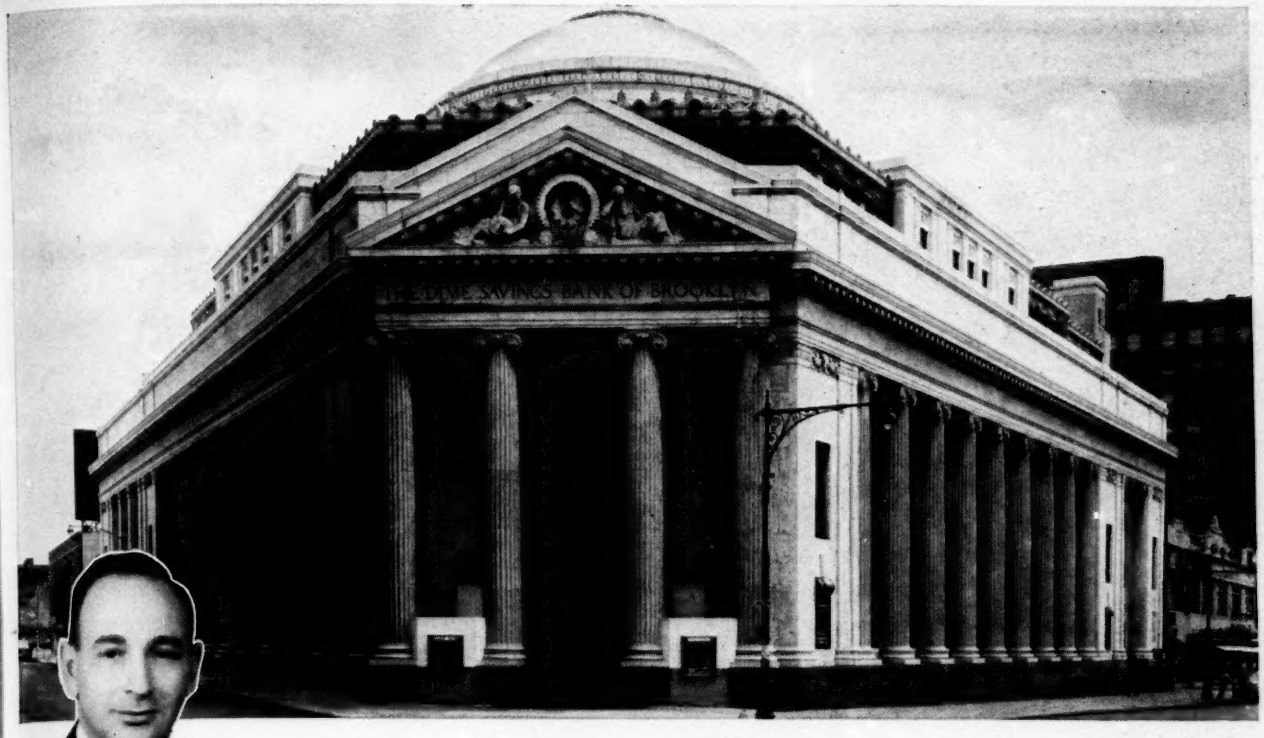
Sales Affilate of Jas. P. Marsh Corporation

Dept. U, Skokie, Ill.

Marsh Instrument & Valve Co. (Canada) Ltd., 8407 103rd Street, Edmonton, Alberta, Canada

MARSH

Quality Heating Specialties since 1865



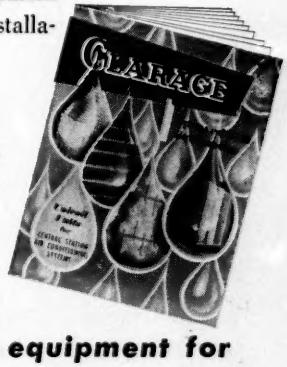
Arthur S. Casella of E. Kalisch, Inc., Contractors

"Our experience made the selection of Clarage a 'must' . . . for the Dime Savings Bank of Brooklyn"

TO WITHSTAND corrosion and assure minimum maintenance, Clarage Unicoils of copper construction were chosen for the air conditioning system of this newly modernized Brooklyn landmark.

These sprayed coil units feature *copper* casings, eliminator plates, and cooling coils . . . and *plastic* spray piping and nozzles. Such features, together with the Unicoil's long-recognized advantages of rugged construction and precise engineering, stand up fully to the severe corrosive action produced by the water in so many regions.

Engineer, contractor, and user satisfaction with the ability of this equipment to perform as specified is shown by the tremendous number of Unicoil installations throughout the nation . . . in buildings of all types, all sizes.



REQUEST Catalog 411, 24 pages of complete information on Unicoil Sprayed Coil Units for central station air conditioning systems. CLARAGE FAN COMPANY, Kalamazoo, Michigan

CLARAGE . . . *dependable equipment for making air your servant*

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COMFORT with a Capitol "C"

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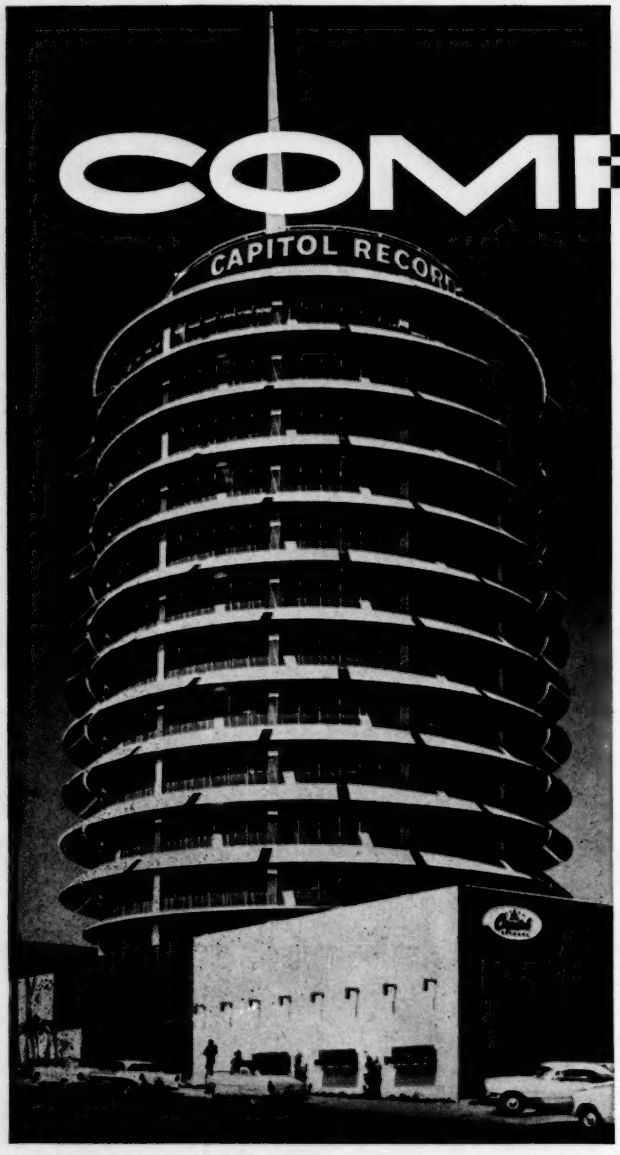
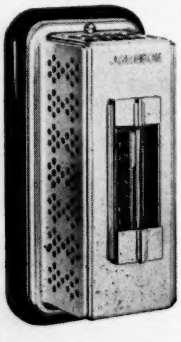


Capitol Tower, Capitol Records, Inc., Hollywood, California. Welton Becket & Associates, architects and engineers, Los Angeles; Western Air & Refrigeration, Inc., mechanical contractor, Los Angeles.

Here in the world's first circular office building—the exciting new Hollywood home of Capitol Records—year 'round comfort is provided by a specially engineered system of Johnson Pneumatic Control.

Whether it's a small private office, one of the spacious general office areas or an isolated "room within a room" studio occupied by a symphony orchestra, Capitol Tower occupants enjoy ideal temperatures continuously. Highlights of this Johnson-engineered control system include:

- *Individual thermostatic control of double-coil unit air conditioners serving the perimeter office areas.*
- *Regulation of three central double duct air conditioning systems, with Johnson Room Thermostats controlling mixing dampers in each of 29 zones.*
- *Static pressure regulation between hot and cold air ducts to insure uniform distribution of conditioned air.*
- *Primary control of all chilled water supplies in conjunction with capacity control of refrigeration equipment.*
- *Weather-compensated zone control of all primary hot air and hot water supply temperatures.*



With Johnson Pneumatic Control, it is far simpler and much more practical to provide any building, small or large, with the kind of modern control features necessary to insure efficient, waste-free air conditioning operation. Johnson helps make your job easier, too, by accepting complete responsibility for all phases of the control work, including installation and future servicing.

Any engineer from one of Johnson's 104 direct branch offices will be glad to submit recommendations on your next control problem. No obligation, of course. Johnson Service Company, Milwaukee 1, Wisconsin.

JOHNSON CONTROL

SINCE 1885

PLANNING • MANUFACTURING • INSTALLING